SONY®

SERVICE MANUAL

VO-1600

VIDEOCASSETTE RECORDER

SONY CORPORATION

VO-1600

August, '72

SUPPLEMENT 2

This supplement updates the service manual to include mechanical changes and latest jig part numbers. File this supplement with service manual.

1. Jig Part Number Changed

A number of changes have been made to the adjustment jigs since the original set, and some jigs, such as the dummy reel packs and the tools for bending the tension arms, have been added.

All previously-issued jigs, with the exception of the Tension Arm Position Jig TD-530, remain applicable. The TD-530 jig is to be used on machines having serial numbers above 11,000.

Code numbers are stamped on the jigs to facilitate identification.

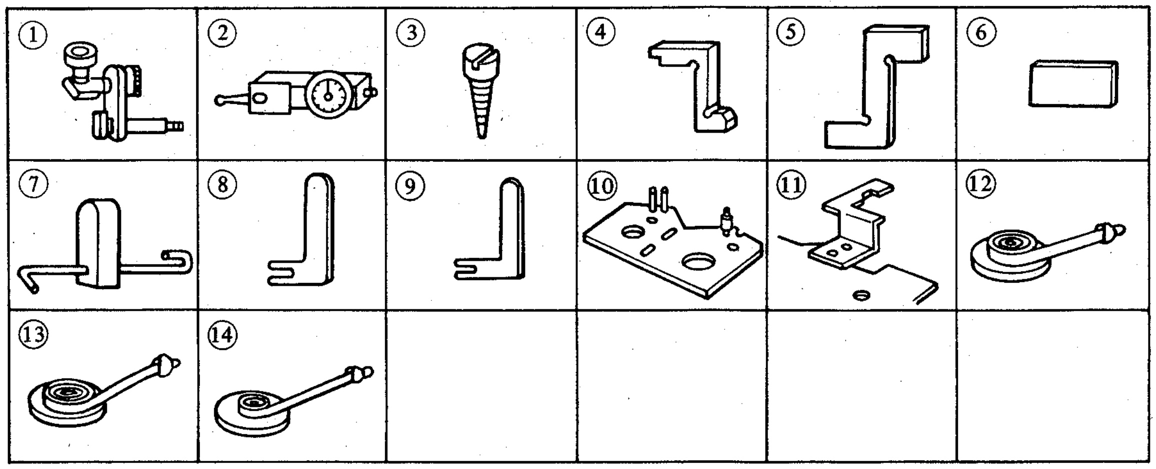
New jigs are marked with an asterisk.

The Tension Arm Position Jig TD-530 is used as shown in Section 5-15 except that the Tension Arm (S) Tape Guide should fit into the notch on the jig.

JIGS REQUIRED FOR MECHANICAL ADJUSTMENTS

Description	Part No.		Jig Code No.	Reference Sketch No.
	Former	New		
Upper Head Drum Alignment Jig	X-03261-04-0 VA-0052	3-702-211-01	TD-052	①
Eccentricity Gauge (should be used with upper head drum alignment jig)		7-732-040-10		②
Dihedral Adjustment Screws (4)	0-324-059-00 VA-0051	3-702-210-01	TD-051	③
Reel-Table Height Adjustment Jig	0-328-121-01 VA-0047	3-702-207-01	TD-047	④
Tension-Arm Height Adjustment Jig	0-328-091-00 VA-0017	3-702-206-01	TD-046	⑤
Audio/Control Head Adjustment Jig	0-328-067-00 VA-0004	3-702-201-01	TD-004	⑥
Threading Ring Drive Pulley Retraction Jig	0-327-170-00	3-702-222-01	TD-513	⑦
*Tension Arm T Bending Jig	0-328-108-00 VA-0027	3-702-204-01	TD-027	⑧
*Tension Arm S Bending Jig	0-328-107-00 VA-0026	3-702-203-01	TD-026	⑨
Back Tension Adjustment Jig	X-03282-41-0 VA-0058	3-702-216-01	TD-058	⑩
*Tension Arm Position Jig	X-36322-44-0 VA-0049	3-702-224-01	TD-530	⑪
Dummy Reel Pack (100 mm dia) (reel table torque adj.)	VA-0056	3-702-215-01	TD-056	⑫
Dummy Reel Pack (118 mm dia) (forward back tension adj.)	VA-0055	3-702-214-01	TD-055	⑬
Dummy Reel Pack (39 mm dia) (forward back tension adj.)	VA-0054	3-702-213-01	TD-054	⑭

JIG SKETCHES



2. Mechanical Parts Changed

All mechanical changes are shown in Exploded Views.
See pages 12-1 to 12-13.

3. Correction of Supplement 1 issued July '72.

Page 2 ..... Part number of D board complete 8-985-302-00 → 8-985-304-00

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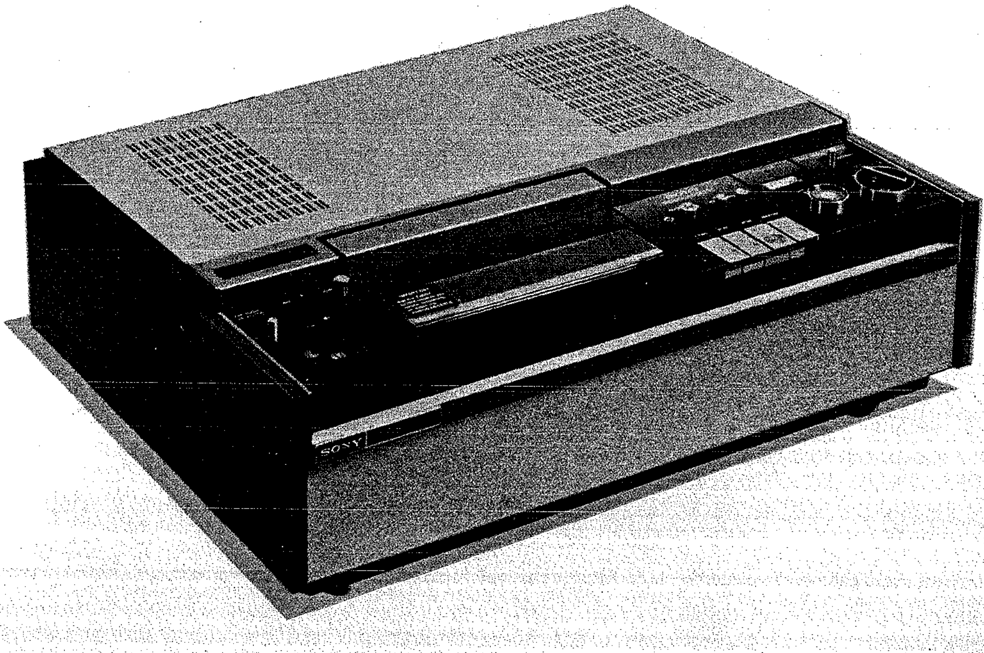
SERVICE MANUAL

VO-1600

VIDEOCASSETTE RECORDER



2nd EDITION

SONY CORPORATION

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NOTE

This manual has been updated to include the data covered in all supplements issued prior to this edition.

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SUPPLEMENT 1

SECTION 1
GENERAL DESCRIPTION

1-1. INTRODUCTION

This manual provides service information for the Sony VO-1600 VIDEOCASSETTE playback/record unit. Service procedures given herein cover field maintenance and do not include those adjustments that require highly specialized factory jigs.

Due to design changes, procedures and data given in this manual are subject to change without notice.

1-2. SPECIFICATIONS

GENERAL

Video recording system:	Rotary two-head helical scan system luminance: fm recording color signal: converted sub-carrier direct recording
Video signal system:	EIA standard, NTSC color signals (American system for color telecasts)
Storage temperature:	14° – 140°F
Operating temperature:	41° – 104°F
Dimensions:	$24\frac{5}{16}$"(W) × $8\frac{1}{16}$"(H) × $18\frac{5}{16}$"(D)
Weight:	59 lb 8 oz
Power requirements:	120V ±5V, 60 Hz ±0.5%
Power consumption:	100W
Antenna system:	300 ohms, balanced, external antenna connector

VIDEO SIGNAL

Inputs:	NTSC composite video 0.5 to 2V (p-p) sync negative 75 ohms unbalanced VHF TUNER INPUT CHANNELS 2 – 13, 300Ω balanced UHF TUNER INPUT CHANNELS 14 – 83, 300Ω balanced	
Output:	1.0V(p-p), 75 ohms unbalanced	
Horizontal resolution:	monochrome	more than 300 lines
	color	more than 240 lines
VHF output signal:	Channel 3 or Channel 4, selectable 75 ohms unbalanced	

AUDIO SIGNAL

MIC. INPUT:	-70 to -30 dBm, 600 ohms
AUX. INPUT:	-20 to +20 dB, 10 k ohms
Output (both 1 st and 2 nd channel)	10 k ohms 0 dB, unbalanced
Crosstalk	better than 40 dB
Frequency response	50 Hz – 12 kHz
Signal-to-noise ratio	better than 42 dB

TAPE TRANSPORT

Tape speed:	$3\frac{3}{4}$ ips
Wow and flutter:	less than 0.2% rms
Playing time:	
SONY KC-Series:	60 min. (KC-60) 30 min. (KC-30)
Fast forward time:	3 min. (using KC-60)
Rewind time:	3 min. (using KC-60)

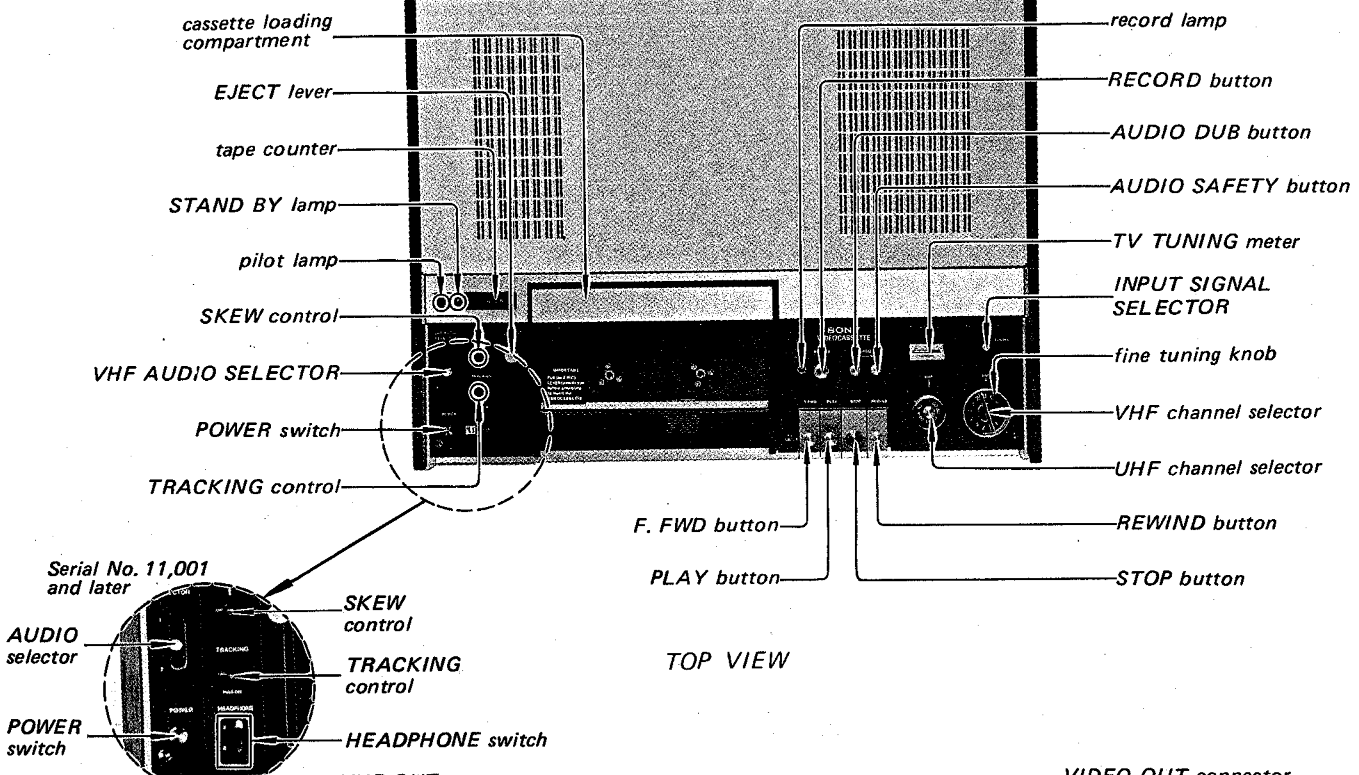
ACCESSORIES SUPPLIED

- Ac power cord
- VHF output cable
- External antenna connector (EAC-13W)
- Balun (EAC-20W)
- Blank tape cassette (KC-10E)
- Polishing cloth

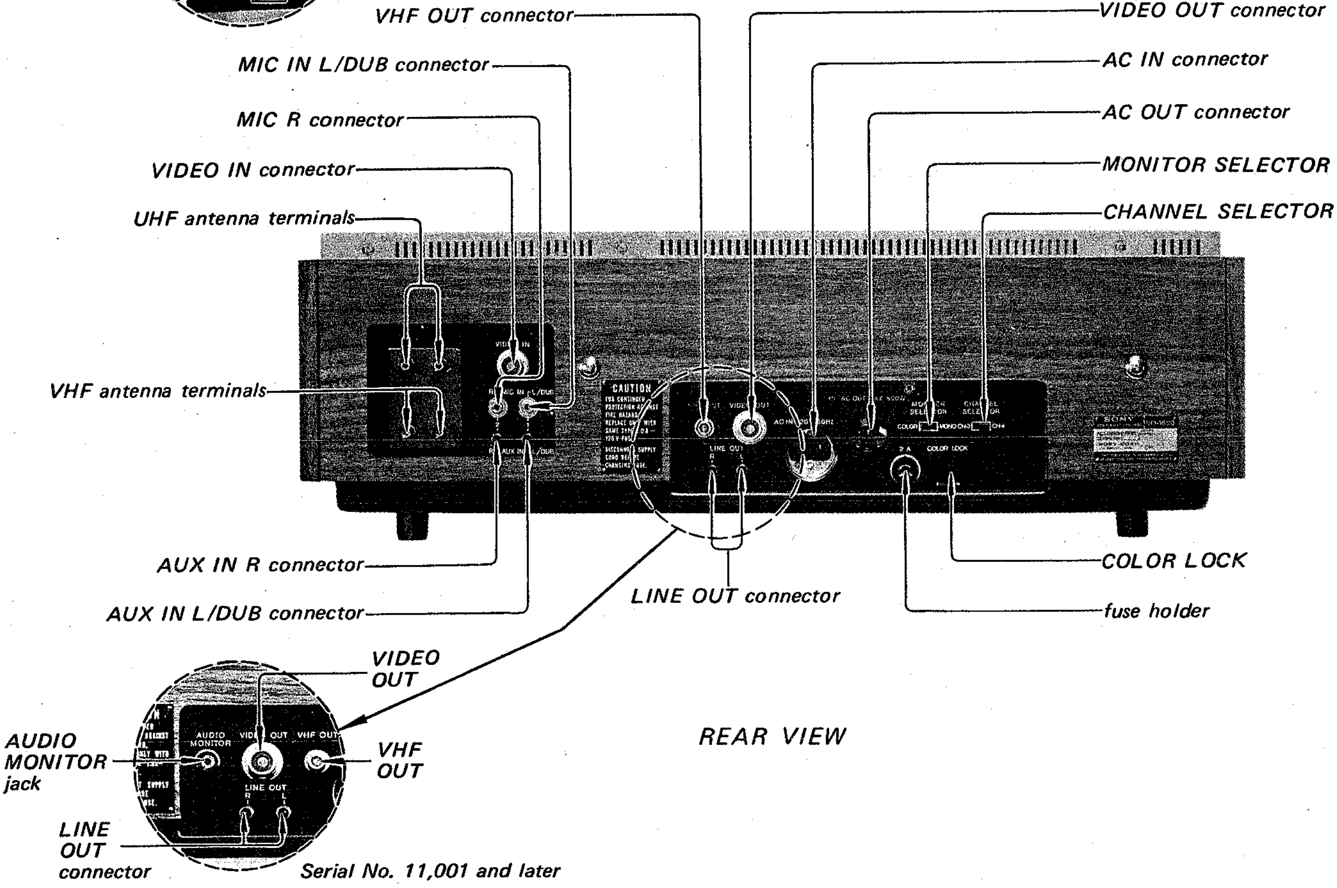
Hz = cycles per second

Design and specifications subject to change without notice.

1-3. CONTROLS, CONNECTORS AND INDICATORS


cassette loading compartment
EJECT lever
tape counter
STAND BY lamp
pilot lamp
SKEW control
VHF AUDIO SELECTOR
POWER switch
TRACKING control
record lamp
RECORD button
AUDIO DUB button
AUDIO SAFETY button
TV TUNING meter
INPUT SIGNAL SELECTOR
fine tuning knob
VHF channel selector
UHF channel selector
F. FWD button
REWIND button
PLAY button
STOP button
Serial No. 11,001 and later
AUDIO selector
SKEW control
TRACKING control
POWER switch
HEADPHONE switch

TOP VIEW


VHF OUT connector
MIC IN L/DUB connector
MIC R connector
VIDEO IN connector
UHF antenna terminals
VHF antenna terminals
VIDEO OUT connector
AC IN connector
AC OUT connector
MONITOR SELECTOR
CHANNEL SELECTOR
CAUTION
AUX IN R connector
AUX IN L/DUB connector
LINE OUT connector
COLOR LOCK
fuse holder
VIDEO OUT
AUDIO MONITOR jack
VHF OUT
LINE OUT connector
Serial No. 11,001 and later

REAR VIEW

1-4. PLAYBACK OPERATION USING R-F OUTPUT

1. Complete the connections shown in Fig. 1-1. The use of the stereo sound system is required for stereo reproduction only.

   It is a good idea to preset the controls on the TV receiver beforehand using a broadcast signal.

2. Depress the POWER switch to turn on the VO-1600.

   The green pilot lamp will light.

   Turn on the TV set.

Note: The VO-1600 provides automatic switching of the VHF antenna feeds to the TV receiver. That is, VHF antenna signals are routed directly through the VO-1600 from the roof antenna of the receiver when the VO-1600 is switched off. When power is switched on, the antenna is disconnected from the receiver and the VHF output of the VO-1600 is substituted.

CAUTION

Connection between the VO-1600 VHF OUT connector and the antenna terminals of a TV receiver should be made only as shown in these instructions. Failure to do so may result in operation that violates the Federal laws regulating the use and operation of r-f devices. Never connect the output of the VO-1600 to an antenna, or make simultaneous (parallel) antenna and VO-1600 connections at the antenna terminals of your receiver.

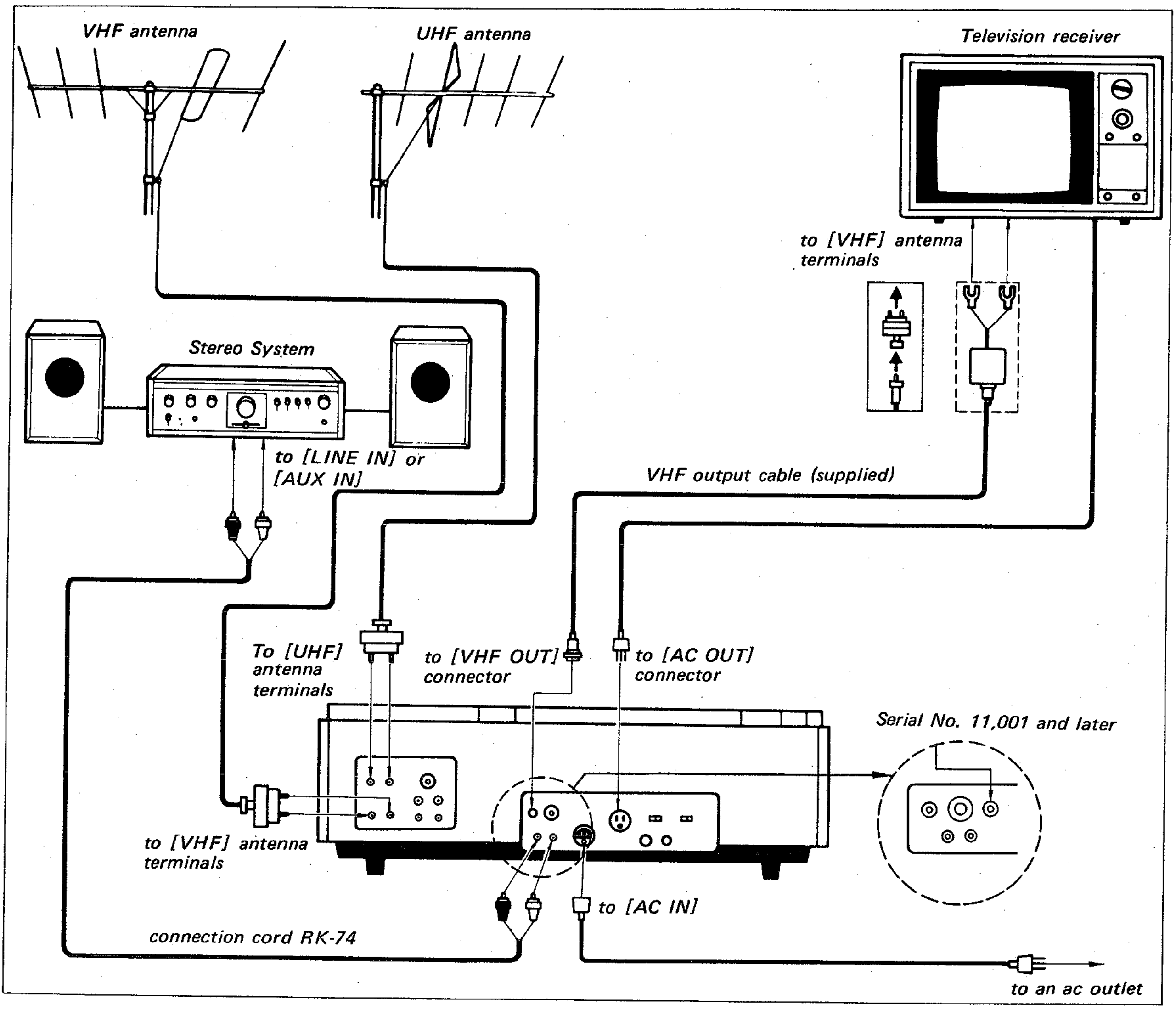

VHF antenna
UHF antenna
Television receiver
to [VHF] antenna terminals
Stereo System
to [LINE IN] or [AUX IN]
VHF output cable (supplied)
To [UHF] antenna terminals
to [VHF OUT] connector
to [AC OUT] connector
Serial No. 11,001 and later
to [VHF] antenna terminals
to [AC IN]
connection cord RK-74
to an ac outlet

Fig. 1-1. RF and audio connections

3. Pull the EJECT lever toward you and insert the VIDEOCASSETTE. Slide the VIDEOCASSETTE in as far as it will go. Once in place, it will drop of its own weight into the play position, and the EJECT lever will return to the former position.
4. Set the CHANNEL SELECTOR on the rear panel to CH-3 or CH-4, whichever is inactive in your locality. For example, if Channel 4 is in use in your city, switch the CHANNEL SELECTOR to CH-3. Once this selector has been set there is no need to reset it.
5. Set the CHANNEL SELECTOR of the television receiver to the same channel number that has been chosen for use by the rear-panel CHANNEL SELECTOR.
6. Press the PLAY button. The orange STAND BY lamp will light. After several seconds, the lamp will go out and playback of the VIDEOCASSETTE will begin.
7. Adjust the Fine tuning knob on the television receiver as in normal TV viewing to obtain a clear sharp picture.
8. The audio signal produced by the TV set is determined by the setting of the AUDIO SELECTOR (VHF) as follows:
   1 ..... to reproduce the sound from the number 1 (L) audio track.
   MIX..to mix the sound from both number 1 and number 2 tracks (monaural sound from a stereo recording).
   2 ..... to reproduce the sound from the number 2 (R) track.
9. If a stereo system is in use, turn down the volume at the TV set, and adjust the volume control on the stereo amplifier as required.

Note: The setting of the front-panel AUDIO SELECTOR (VHF) has no effect upon the audio signal produced at the LINE OUT audio output jacks.

10. When the tape comes to its end the machine will stop automatically, and the function buttons will be unlocked.
    You may also stop the tape at any point by pressing the STOP button.

Rewind and Fast Forward

Rewind and fast forward operations may be performed after the machine has been placed in the stop mode.

1. Press the STOP button and wait until the STAND BY lamp goes out signaling the completion of the unthreading operating.
2. Press F FWD or REWIND buttons.
3. Press STOP button at the desired point on the tape.
   The tape will also stop automatically at either end of the tape.

Operating Notes

1. Always wait until the orange STAND BY lamp goes out before trying to eject the VIDEOCASSETTE or initiating fast-forward or rewind operations.
2. Remember to go to stop when changing functions. For example to go from play to rewind, it is necessary to go to stop, wait until the STAND BY lamp goes out, and then press REWIND.
3. If the machine fails to function as desired when you press the PLAY, REWIND or F FWD buttons, check to make sure that the tape is not at either end of its travel. For example, if the tape has reached the end of the play operation and has stopped automatically. pressing the PLAY button will cause the tape to thread and then shut off automatically.
   Similarly, if the tape is fully rewound, and the REWIND button is pressed the machine will continue to run in the rewind mode. In this case, press the STOP button before proceeding with the desired mode of operation.

VIDEOCASSETTE Removal

The VIDEOCASSETTE may be removed after the machine has been put into the stop mode, either automatically or by pressing the STOP button. When stop is initiated, the tape will thread back into the stop is initiated, the tape will thread back into the VIDEOCASSETTE to permit removal. For the few seconds that it takes for the tape to return to the VIDEOCASSETTE the orange STAND BY lamp will light.

When the lamp goes out, unthreading is complete, and the VIDEOCASSETTE may be removed.

1. Press the STOP button and wait until the STAND BY lamp goes out. Or if the machine has stopped automatically, check to see that the STAND BY lamp is extinguished before proceeding.
2. Pull the EJECT lever toward you.
3. Remove the VIDEOCASSETTE.

Antenna Switching

If an external VHF antenna is connected to the VHF antenna terminals, VHF antenna switching will be performed automatically as follows:

1. With the POWER switch off the external antenna will be connected to the VHF output terminals so that the TV set will receive signals from the external antenna.
2. With the POWER switch ON the external antenna is automatically disconnected from the TV receiver and the output of the VHF modulator (CH3 or CH4) is substituted. This is the normal setup for playback of VIDEOCASSETTES.
3. With power switch ON and the RECORD button depressed, the signal produced by the VHF modulator will be either the signal selected by the VHF tuner in the VO-1600 (TV operation) or the video signal applied to the VIDEO IN connector (EXT operation). These functions are summarized in Fig. 1-2.

Automatic antenna switching is not provided for UHF. If off-the-air recordings are to be made from UHF stations, the external UHF antenna must be disconnected from the receiver terminals and connected (for the duration of the recording) to the UHF terminal at the rear of the VO–1600.

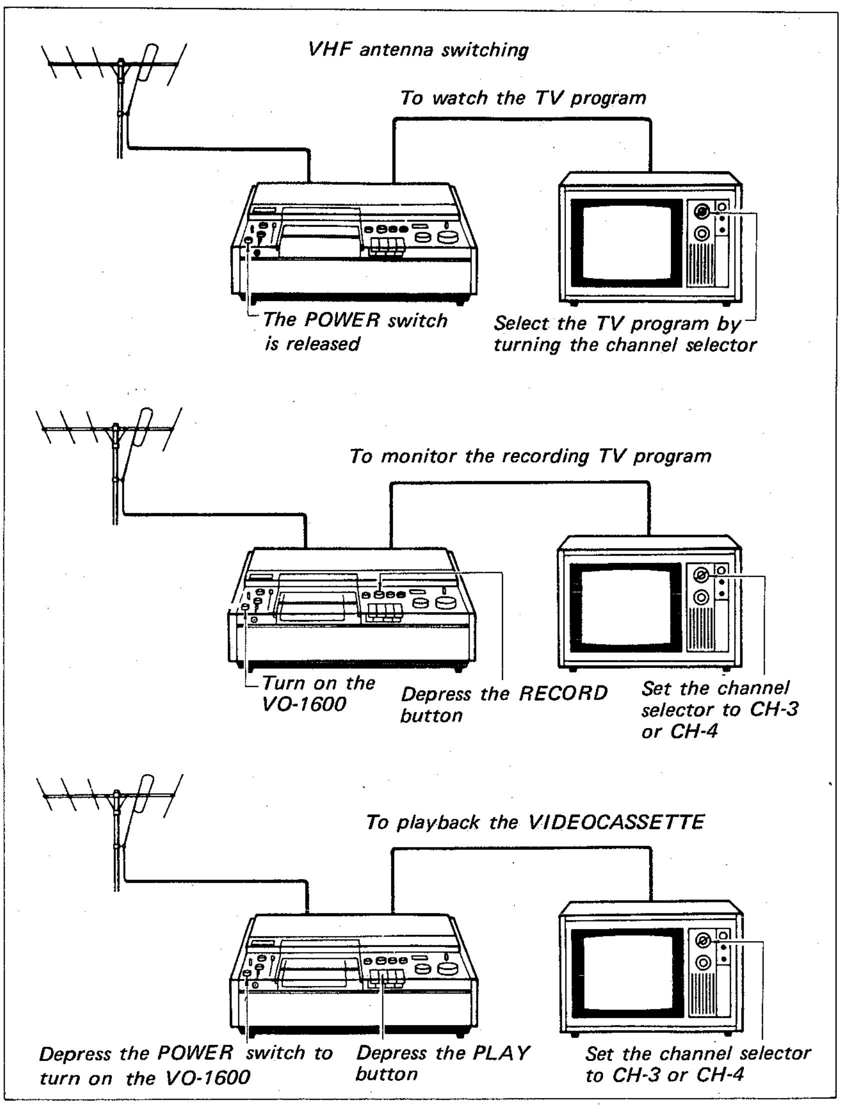

VHF antenna switching
To watch the TV program
The POWER switch is released
Select the TV program by turning the channel selector
To monitor the recording TV program
Turn on the VO-1600
Depress the RECORD button
Set the channel selector to CH-3 or CH-4
To playback the VIDEOCASSETTE
Depress the POWER switch to turn on the VO-1600
Depress the PLAY button
Set the channel selector to CH-3 or CH-4

Fig. 1-2. Antenna switching

1-5. VIDEO PLAYBACK OPERATION

1. Complete the connections shown in Fig. 1-3.
2. Set the MONITOR SELECTOR switch on the rear panel to COLOR or MONO in accordance with the type of monitor connected.
3. Insert the prerecorded VIDEOCASSETTE into the VO-1600.
4. Press the PLAY button.
   Playback pictures will appear after the STAND BY lamp has gone out.
5. Adjust sound volume at the controls of the stereo amplifier.

Using the Monaural Audio Section of the Monitor

If it is desired to distribute audio to the speaker in the monitor(s), proceed as follows:

1. Connect the L and R outputs of the VO-1600 to the auxiliary inputs of a stereo preamplifier or an integrated amplifier equipped with preamp output jacks.
2. Connect the line output of the L or R preamp to the line input of the monitor.
3. Set the mode switch on the preamp to L or R to select either audio track for monaural (or bilingual) recordings. Set the mode switch to L + R if the recording is stereo.

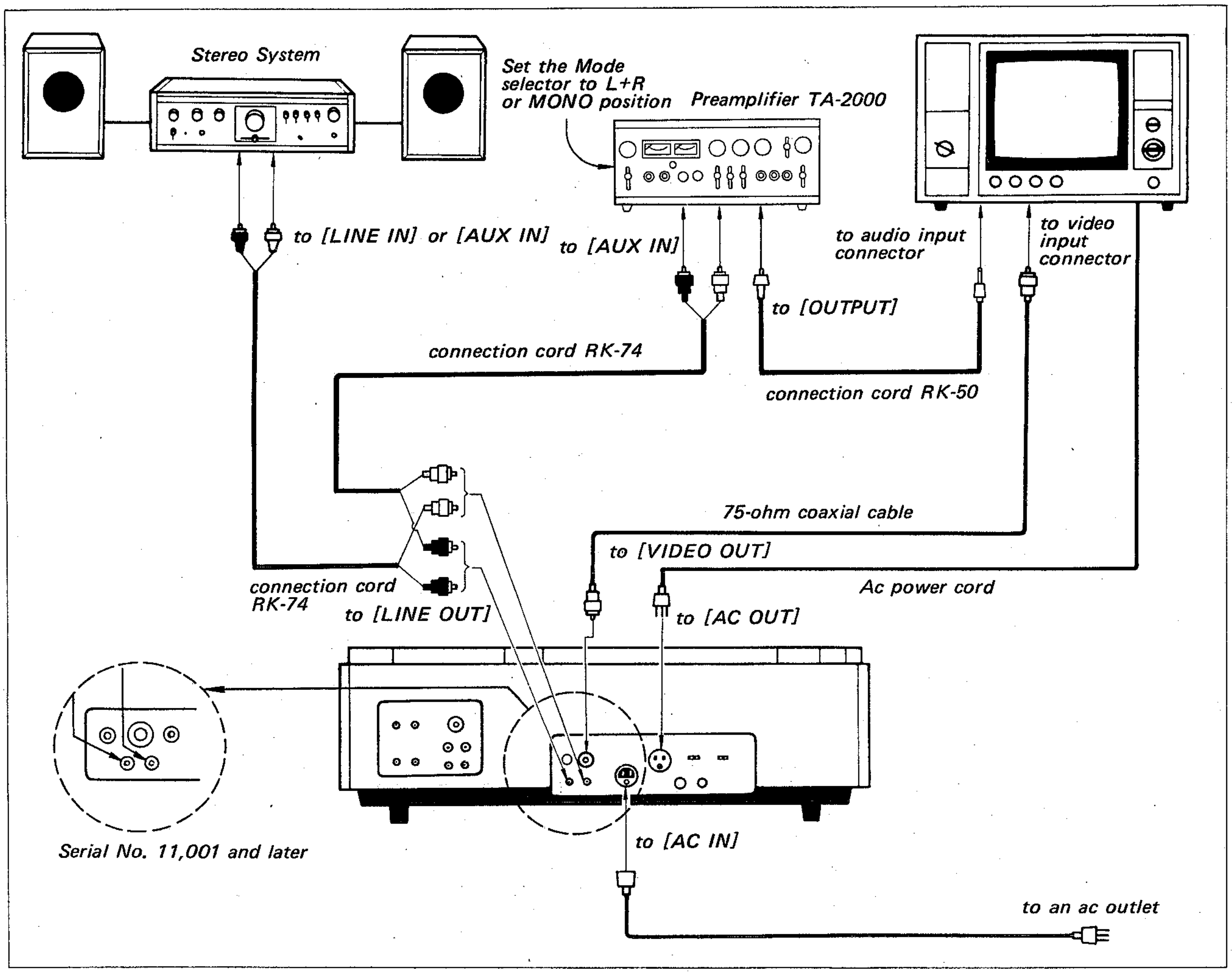

Stereo System
Set the Mode selector to L+R or MONO position
Preamplifier TA-2000
to [LINE IN] or [AUX IN]
to [AUX IN]
to audio input connector
to video input connector
to [OUTPUT]
connection cord RK-74
connection cord RK-50
75-ohm coaxial cable
to [VIDEO OUT]
Ac power cord
connection cord RK-74
to [LINE OUT]
to [AC OUT]
Serial No. 11,001 and later
to [AC IN]
to an ac outlet

Fig. 1-3. Video/audio connections

1-6. ADJUSTMENT OF THE PLAYBACK PICTURE

Skew Adjustment

Displacement of vertical lines in the picture in a horizontal direction at the top or very bottom of the picture indicates the need for SKEW adjustment. Turn the control to the left or right as needed.

Tracking Adjustment

In some cases streaks of snow may appear in the playback of tapes made on other VIDEOCASSETTE recorders. To correct this condition perform the tracking adjustment as follows:

Pull the TRACKING control straight up and then rotate it in either direction until the best picture is obtained. When playback of this particular tape is finished, return the TRACKING knob to its original position by pushing it down.

Color Lock Adjustment

The VIDEOCASSETTE Recorder is preadjusted to reproduce correct color. Therefore, it is rare that adjustment of color lock will be required. However, if the picture should suddenly lose color or cannot maintain correct hues, adjust the COLOR LOCK control. Pull out this control and rotate it slowly to the left or right until a normal picture is restored. Push the control back in when this particular tape is finished.

1-7. OFF-THE-AIR RECORDINGS

1. Complete the connections shown in Fig. 1-4. For best results, use an antenna that provides clean ghost-free pictures on the selected channel.
2. Check the bottom of the cassette on which recordings are to be made. Make sure that the Safety Cap is in place. Recordings cannot be made if the cap has been removed.
3. Insert the VIDEOCASSETTE into the VO-1600.
4. Set the CHANNEL SELECTOR on the rear of the VO-1600 to whichever channel is not in use in your broadcast area. In other words, use Channel 3 if Channel 4 is one of the active channels in your locality.
5. Set the channel selector on the TV receiver to the channel selected in Step 4.
6. Depress the power switch on the VO-1600.
7. Set the INPUT SIGNAL SELECTOR to TV.
8. Press the RECORD button and select the desired channel using the channel selector on the VO-1600. A picture should appear on the screen of the TV set. Adjust fine tuning on the VO-1600 for a maximum reading on the TV-TUNING meter. This setting should coincide with best picture on the TV receiver. Touch up the tuning adjustments on the TV set if necessary.

   Note: In this hookup, all channel selection is accomplished at the tuner in the VO-1600. The TV set remains tuned to Ch 3 or Ch 4. If fine tuning on the VO-1600 is severely misadjusted, a poor picture may be obtained even if the TV tuning meter reads in the green zone. Adjust fine tuning on the VO-1600 until a green-zone reading corresponds with best observable picture.
9. Reset the tape counter to 000.
10. When a satisfactory picture has been obtained, you may begin the recording by holding down the RECORD button and pressing the PLAY button. Audio is recorded on track 2 (right channel) only during TV recordings.
11. At the end of the recording, push the STOP button. If tape should run out during the recording, the Automatic Stop function will be initiated. The mechanism will stop and tape will be unthreaded.

    Notice: Television programs may be copyrighted. Recording such material may be contrary to the provisions of the United States copyright laws.

1-8. RECORDINGS FROM AN EXTERNAL SOURCE

1. Recordings from an external source of video and audio such as cameras, line feeds, or microphones may be made using the setup shown in Fig. 1-5. Cameras must conform to American TV standards using EIA or industrial sync.
2. Set the INPUT SIGNAL SELECTOR to EXTERNAL.
3. Check to make sure that the Safety Cap is in place in the VIDEOCASSETTE and insert the cassette into the VO-1600.
4. Depress the POWER button.
5. Reset the tape counter to 000.

6. Depress the RECORD button. This sets up the "E-to-E" mode and the monitor should display the source of input video. Make all camera adjustments in readiness for recording.
7. Hold the RECORD button down and depress the PLAY button.
8. Push the STOP button at the end of the recording.

1-9. SOUND DUBBING

Audio may be recorded on Sound track number 1 (left channel) to an existing video recording as follows:

1. To record from a microphone, connect the microphone cable to the MIC IN L/DUB jack. If a high level source of audio is used, connect the source to the AUX IN L/DUB jack.
2. Set the INPUT SIGNAL SELECTOR to EXTERNAL.
3. Set up the playback mode as directed in Section 1-4 or 1-5.
4. At the point in the tape where audio is to be added approaches, press the AUDIO SAFETY button. Then press the AUDIO DUB button at the precise point at which dubbing is to begin.

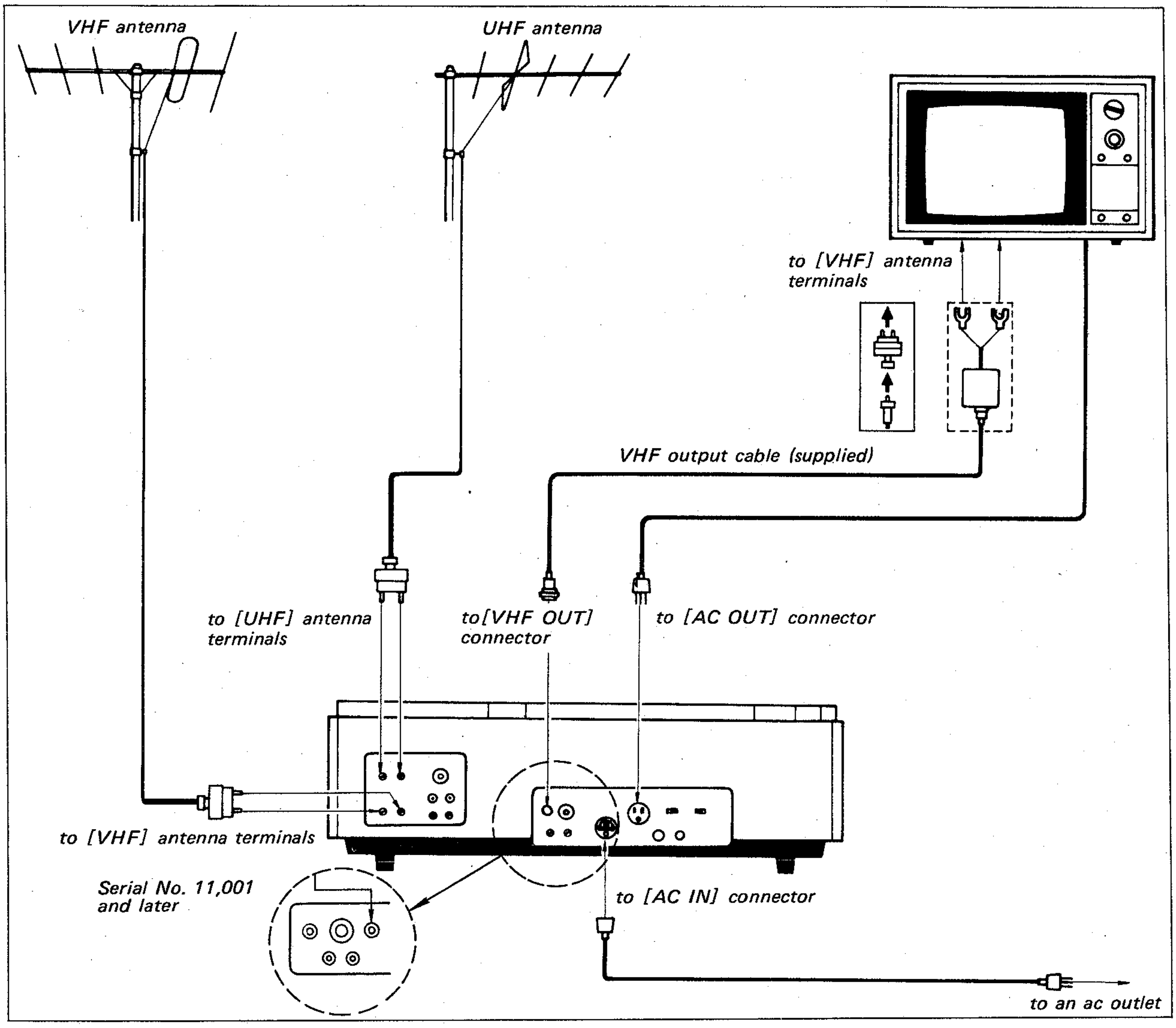

VHF antenna
UHF antenna
to [VHF] antenna terminals
VHF output cable (supplied)
to [UHF] antenna terminals
to[VHF OUT] connector
to [AC OUT] connector
to [VHF] antenna terminals
Serial No. 11,001 and later
to [AC IN] connector
to an ac outlet

Fig. 1-4. Off-the-air recordings

1-10. CLEANING THE VIDEO HEADS

Partial erasure of the picture, the appearance of snow or streakes in the playback picture may indicate the need for cleaning of the video heads. This is accomplished with the Cleaning Cassette as follows:

1. Insert the Cleaning Cassette into the Cassette compartment as you would a VIDEO-CASSETTE.
2. Reset the tape counter to 000.
3. Push the PLAY button and watch the tape counter. Press the STOP button at 010 (about 30 seconds).
4. Remove the Cleaning Cassette. Do not rewind the Cleaning Cassette at the end of each use. Rewind when the cleaning tape reaches its end and trips the automatic shut off switch.
   The Cleaning Cassette may be rewound and reused several times. However, after prolonged use the Cassette will lose its effectiveness and will require replacement.

Do not use the Cleaning Cassette unless the picture symptoms (snow or streakes of snow, etc.) clearly indicate the need for video head cleaning. Excessive use of the Cleaning Cassette may shorten head life.

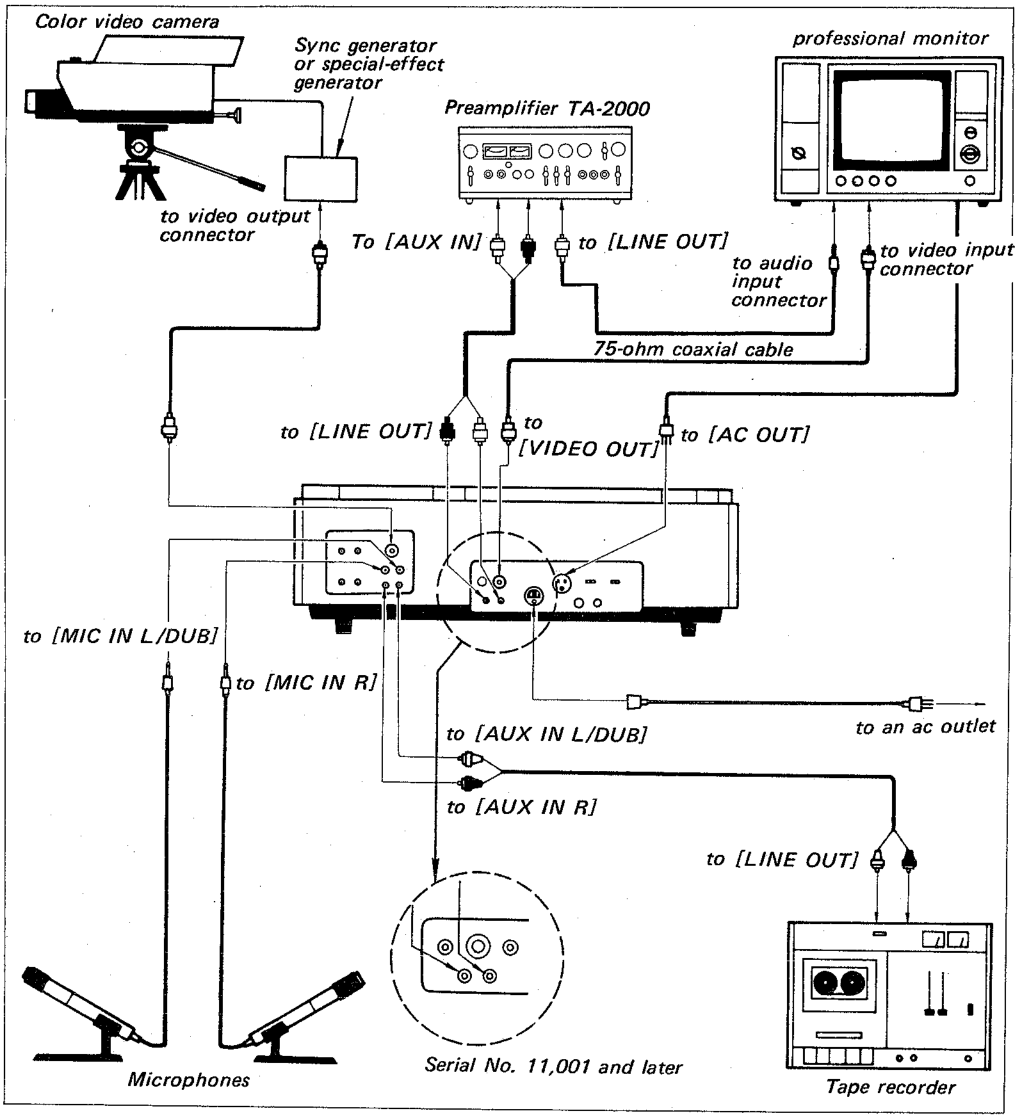

Color video camera
Sync generator or special-effect generator
professional monitor
Preamplifier TA-2000
to video output connector
To [AUX IN]
to [LINE OUT]
to audio input connector
to video input connector
75-ohm coaxial cable
to [LINE OUT]
to [VIDEO OUT]
to [AC OUT]
to [MIC IN L/DUB]
to [MIC IN R]
to [AUX IN L/DUB]
to an ac outlet
to [AUX IN R]
to [LINE OUT]
Microphones
Serial No. 11,001 and later
Tape recorder

Fig. 1-5: Recordings from an external source

SECTION 2
TAPE TRANSPORT

2-1. GENERAL

The tape transport in the VO-1600 provides the mechanism for moving tape past the rotary and stationary heads at the correct speed of 93.5 mm per second (approximately 3-3/4 inches per second). In addition the transport mechanism performs threading and unthreading operations as well as fast forward and rewind operations. The latter are performed while the tape is inside the cassette.

The mechanical action of the tape threading system is shown simplified in Fig. 2-1. When the cassette drops into the operating position, the door of the cassette is opened and the threading roller is positioned in the triangular notch in the front edge of the cassette. This places the threading roller inside the tape span between supply and take-up hubs. At the beginning of the threading cycle the threading ring turns in the clockwise direction and the tape loop is withdrawn from the cassette as shown in b of the figure. The threading ring rotates in a plane that angles downward towards the front of the machine. As the threading ring rotates the pinch roller (mounted on the threading ring) comes up inside the loop. Thus, when threading is complete the pinch roller is positioned opposite the capstan inside the tape loop. At the end of the threading operation, the pinch roller pressure plate is pressed against the pinch roller shaft to squeeze tape between the pinch roller and the capstan.

Unthreading is accomplished by releasing the pinch roller and rotating the threading ring in a counterclockwise direction. During the unthreading cycle, the supply reel is braked and the tape loop is accumulated on the take-up reel.

Fast Forward and Rewind are accomplished while the tape remains inside the cassette. Driving torque is applied directly to the take-up or supply reel tables. Details of the mechanical system are as follows: For an explanation of system control, which electrically sets up the various modes of operation, refer to Section 3-4.

2-2. THREADING AND UNTHREADING SEQUENCE

1. Threading:
   The brake is released on the supply reel table by solenoid A. Tape is pulled from the supply reel table by the threading roller. Refer to Figures 2-2 and 2-3.
2. During threading, to avoid tape slack, back tension is applied to supply reel table. (Threading back tension)
3. When a large tape pack is on the supply reel, tape is like to slacken around the head drum due to the inertia of the supply reel. To prevent the possibility of tape slack at the end of the threading cycle, an additional brake is pulled in momentarily. (Threading brake)

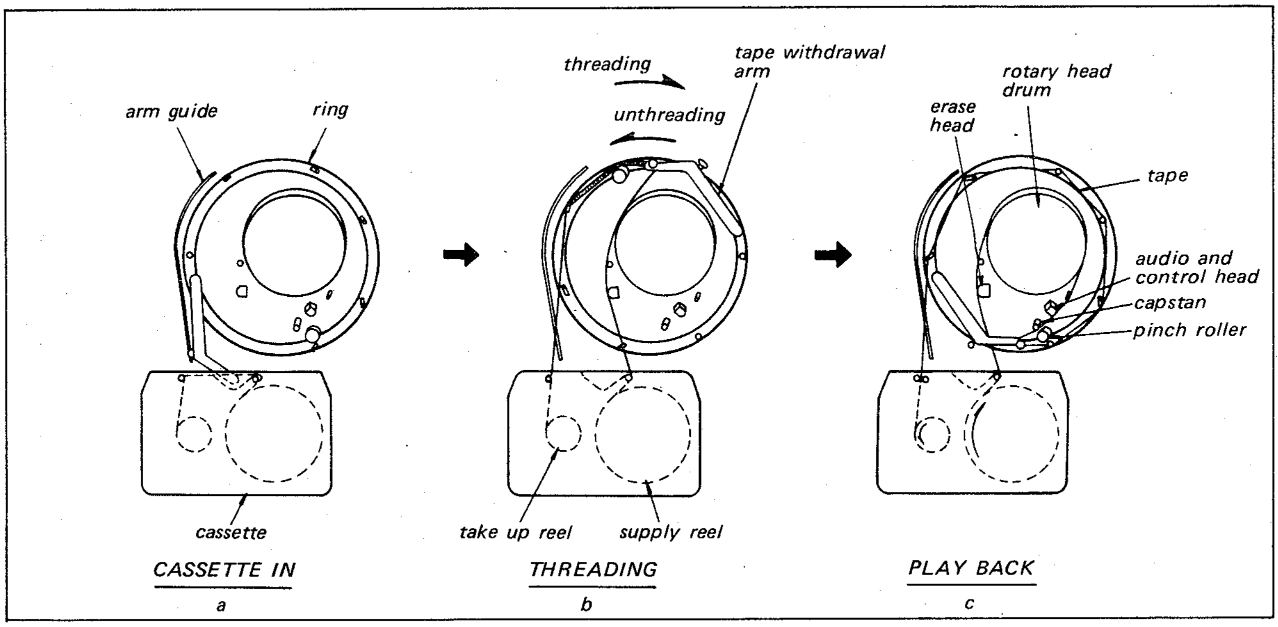


Fig. 2-1. Automatic tape threading mechanism

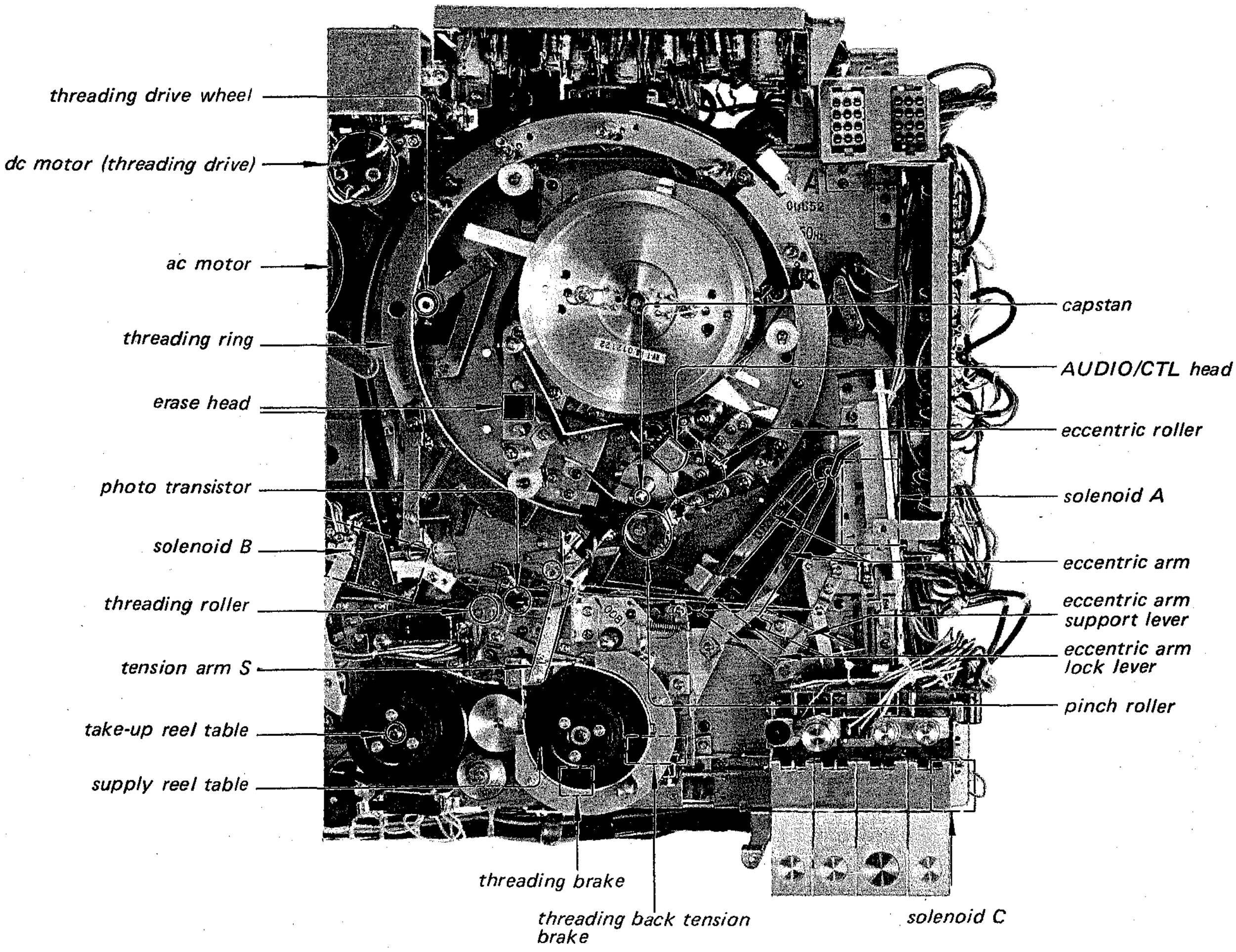

threading drive wheel
dc motor (threading drive)
ac motor
threading ring
erase head
photo transistor
solenoid B
threading roller
tension arm S
take-up reel table
supply reel table
threading brake
threading back tension brake
solenoid C
capstan
AUDIO/CTL head
eccentric roller
solenoid A
eccentric arm
eccentric arm support lever
eccentric arm lock lever
pinch roller

Fig. 2-2. Mechanical parts location

4. Even if the Threading Brake functions properly, there is still a possibility that tape slack will occur depending on the timing of threading brake engagement. When tape is driven by the capstan the tape tends to ride up and down on the guides at first due to excess slack in the tape. A small amount of tape slack is allowable as long as the tape stabilizes within three up and down movements after the pinch roller is engaged.
5. Unthreading:
   The brake on the supply reel table is engaged. The tape is wound on the take-up reel as the unthreading mechanism returns.
6. There is a possibility that slack tape will be caught in adjacent parts if the threading mechanism returns faster than the take-up reel table can take up tape. The unthreading speed is adjusted so that tape slack will not occur at the lowest take-up speed. This should be at the very beginning of a tape. There would be no tape pack on the take-up reel table at this time.
7. If tape slack occurs during the unthread cycle at the end of a tape (tape pack on take-up reel is large), the take-up reel table rotation may not be smooth. If this occurs, make sure the tape cassette is seated properly on the cassette loading platform. Double check for proper operation after several rewind and fast forward operations.

2-3. AUTO-REWIND

(Refer to Figs. 2-2 and 2-4.)

1. Tape is pulled from the supply reel while threading and taken up on the take-up reel while unthreading. Thus, each time the machine is put into the stop mode, the tape advances by the amount of tape required for the unthread cycle. If the machine is then put back into play, that amount of tape would be lost. To compensate for this, the tape is automatically rewound for approximately one second after each unthread cycle. (Auto rewind (1))
2. If tape threading is initiated around the end of the tape, it is possible for the supply reel to run out of tape before the threading ring completes its cycle. To avoid this problem, the tape is automatically rewound for approximately four seconds each time "stop" is initiated by the clear leader, when the machine has been in the fast forward mode. (Auto-Rewind (2))

2-4. REWIND AND FAST FORWARD

(Refer to Figs. 2-2, 2-5 and 2-6.)

1. Rewind and Fast Forward are always accomplished in the cassette itself. The tape is not threaded around the head drum.
2. Rewind or Fast Forward is accomplished by pressing drive wheel located between the two reel tables against either the supply reel table or take-up reel table.
3. Rewind is accomplished by solenoid B simultaneously pressing the drive wheel against supply reel table and releasing supply-reel brake.
4. Fast Forward is accomplished by depressing Fast Forward button. This action presses the drive wheel against take-up reel table while simultaneously solenoid A releases supply reel brake.
5. Both ends of the tape have clear leaders attached. This clear leader will initiate automatic stop in all modes, returning the machine to stop and releasing the function buttons.
6. For a sixty minute cassette, Rewind or Fast Forward should take two and one-half to three minutes. If it is found that Rewind or Fast Forward time takes longer than three minutes, the fault may be due to the reels in the cassette not turning smoothly. Make sure the tape cassette is seated properly on the cassette platform.
7. If after the tape has stopped automatically at the end of Rewind, and the Rewind button is depressed again, Auto Stop will not function. All the tape will be rewound on the supply reel table and the tape will stall. This operation should not damage the cassette; however, the drive idler will wear severely. Therefore, the machine should never be left in this mode of operation.

2-5. PLAY

(Refer to Figs. 2-2 and 2-3.)

1. When the Play button is depressed, the dc threading motor is powered to drive the threading ring.
2. When threading ring completes approximately two thirds of its rotation, a microswitch is made that powers the ac motor.

3. At the end of the thread cycle, a microswitch is opened and the dc motor is disabled. This completes the threading cycle. At the same time, the eccentric-roller lock lever is released, and the pinch roller is moved toward the capstan by the eccentric-roller located underneath the capstan mounting plate.
4. As soon as the pinch roller presses against the capstan, the pinch roller is locked in position by the lever linked with solenoid A. After the pinch roller is locked, the eccentric roller returns to a neutral position.
5. As the pinch roller presses against the capstan, the tension arms on both supply and take-up reels are actuated to maintain proper tape tension.
6. When the Stop button is depressed, solenoid "A" is released, and the lock lever which keeps pinch roller pressing against the capstan is released by spring tension. The eccentric roller is driven by the capstan shaft and returns the pinch roller to the "rest" position. At the same time, the dc motor reverses and drives the threading ring back to the unthread position. The ac motor is still powered, so the tape is taken up by the take-up reel.
7. After the unthread cycle is completed, tape is rewound automatically for approximately one second.
8. During the time of unthread and auto rewind, after the stop button is depressed, the "Standby Lamp" is lit, warning the operator not to press other function buttons until the standby light extinguishes.

2-6. FUNCTION BUTTONS

1. Each button (Play, Fast Forward, Rewind and Stop) is linked to a slide switch.
2. When buttons such as Play, Fast Forward and Rewind are depressed, solenoid A or solenoid B will be energized so that the supply reel brake is released and push buttons are locked by the plate which is engaged by the solenoid C.
3. When any button except Stop is depressed, the mechanism locks out all buttons except Stop.
4. Depressing the Stop button releases solenoid A or B and the lock will be released.
5. During the unthread cycle, the plate linked with the thread ring locks out Fast Forward and Rewind buttons.
6. A transparent leader is attached at both ends of the tape. The transparent leader activates a photo transistor to provide the automatic stop signal. Automatic stop releases solenoid A or B releasing the previously selected function button putting the unit in the Stop mode.
7. During auto-rewind, solenoid B activates the lock plate that locks out all buttons except Stop button.

2-7. RECORD FUNCTION BUTTONS

1. During the Play mode the Record and Audio Dub buttons are locked out mechanically.
2. Audio channel 1 can be put into the Record mode during playback by pushing the Safety and Audio Dub buttons in sequence. The Safety button locks the Audio Dub button.
3. Recordings are started by pushing the Record and Play buttons simultaneously.
4. When the Stop button is depressed, all record function buttons are released and locked out.

2-8. CASSETTE LOADING COMPARTMENT AND ITS LOCKING MECHANISM

1. The cassette loading compartment allows the cassette to be inserted horizontally, then drops into place by gravity.
2. When the cassette is inserted into the slot, the tape cover is unlocked. As the cassette drops, the front tape cover is pushed open and the tape threading roller is positioned inside the tape loop.
3. As soon as the cassette drops into place, a microswitch closes allowing the unit to operate.
4. After the tape cassette is lowered the cassette loading compartment can be raised in the Stop mode only. In all other modes of operation, the platform is locked in the down position. This includes Play, Fast Forward, Rewind, Threading, Unthreading, and Auto-Rewind.

2-9. SUMMARY OF MECHANICAL ACTION

Figures 2-3 through 2-6

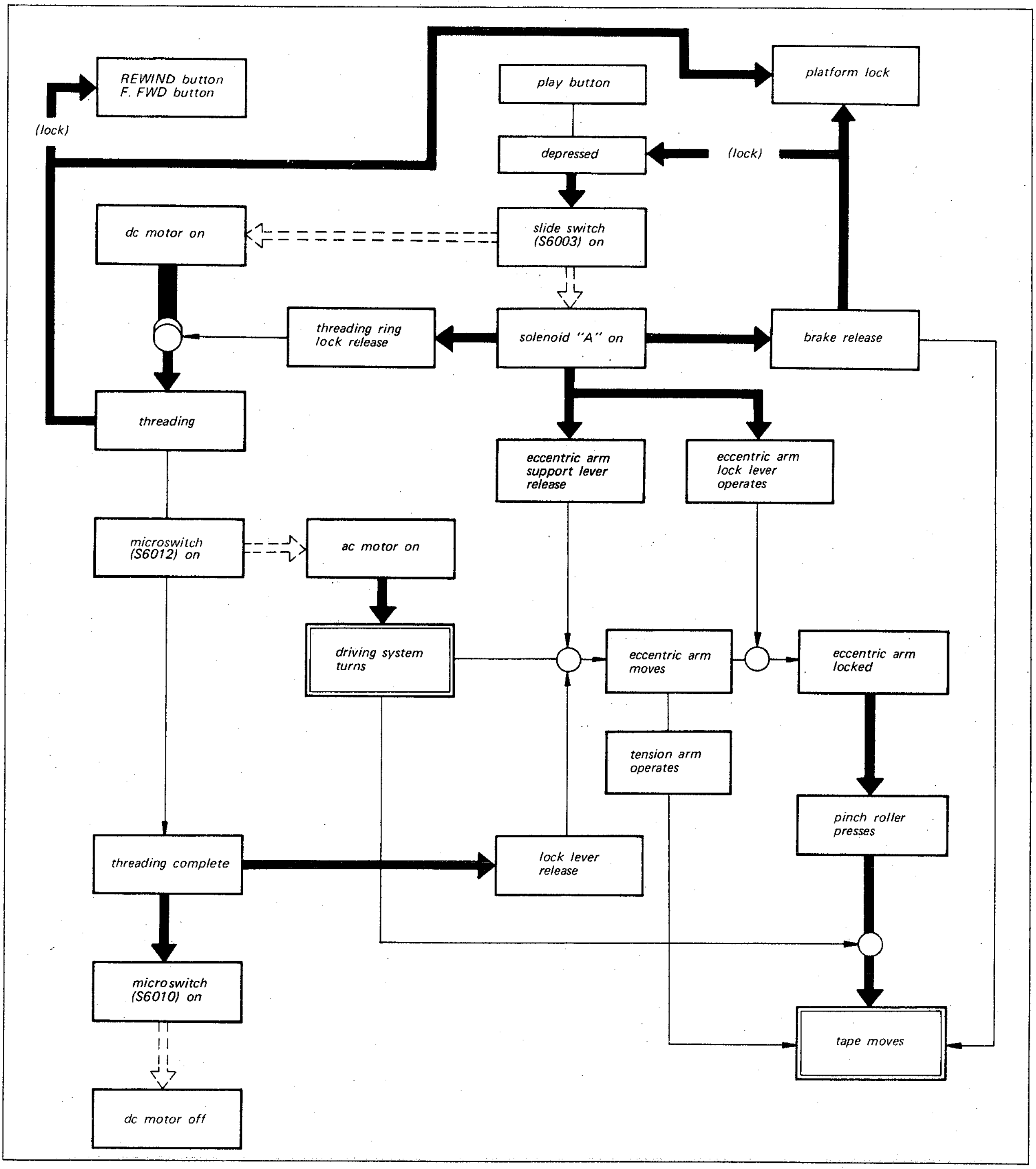

REWIND button
F. FWD button
(lock)
play button
platform lock
depressed
(lock)
dc motor on
slide switch (S6003) on
threading ring lock release
solenoid "A" on
brake release
threading
eccentric arm support lever release
eccentric arm lock lever operates
microswitch (S6012) on
ac motor on
driving system turns
eccentric arm moves
eccentric arm locked
tension arm operates
pinch roller presses
threading complete
lock lever release
microswitch (S6010) on
tape moves
dc motor off

Fig. 2-3. Play mode sequence

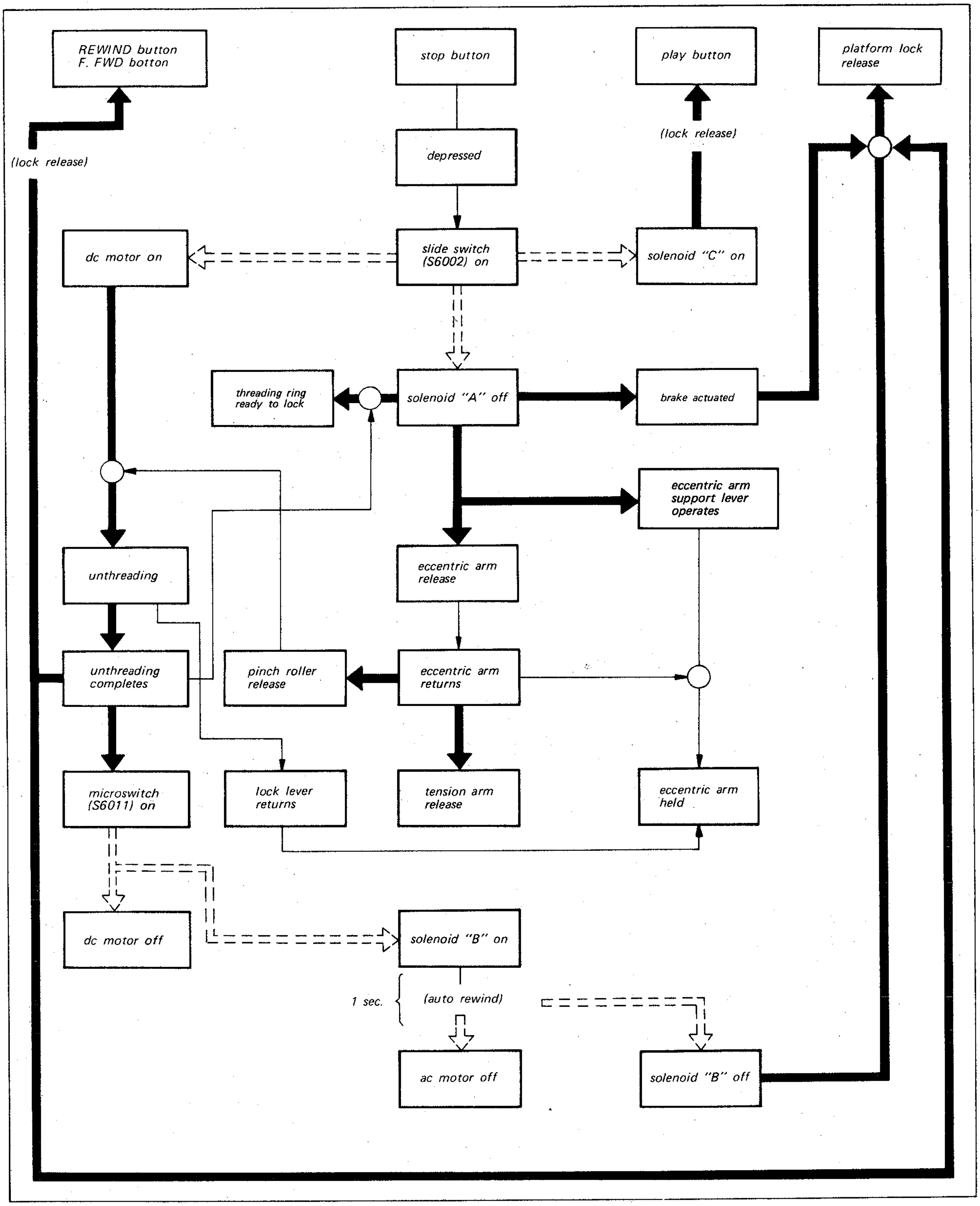

REWIND button
F. FWD botton
stop button
play button
platform lock release
(lock release)
depressed
(lock release)
dc motor on
slide switch (S6002) on
solenoid "C" on
threading ring ready to lock
solenoid "A" off
brake actuated
eccentric arm support lever operates
unthreading
eccentric arm release
unthreading completes
pinch roller release
eccentric arm returns
microswitch (S6011) on
lock lever returns
tension arm release
eccentric arm held
dc motor off
solenoid "B" on
1 sec.
(auto rewind)
ac motor off
solenoid "B" off

Fig. 2-4. Stop and auto rewind sequence

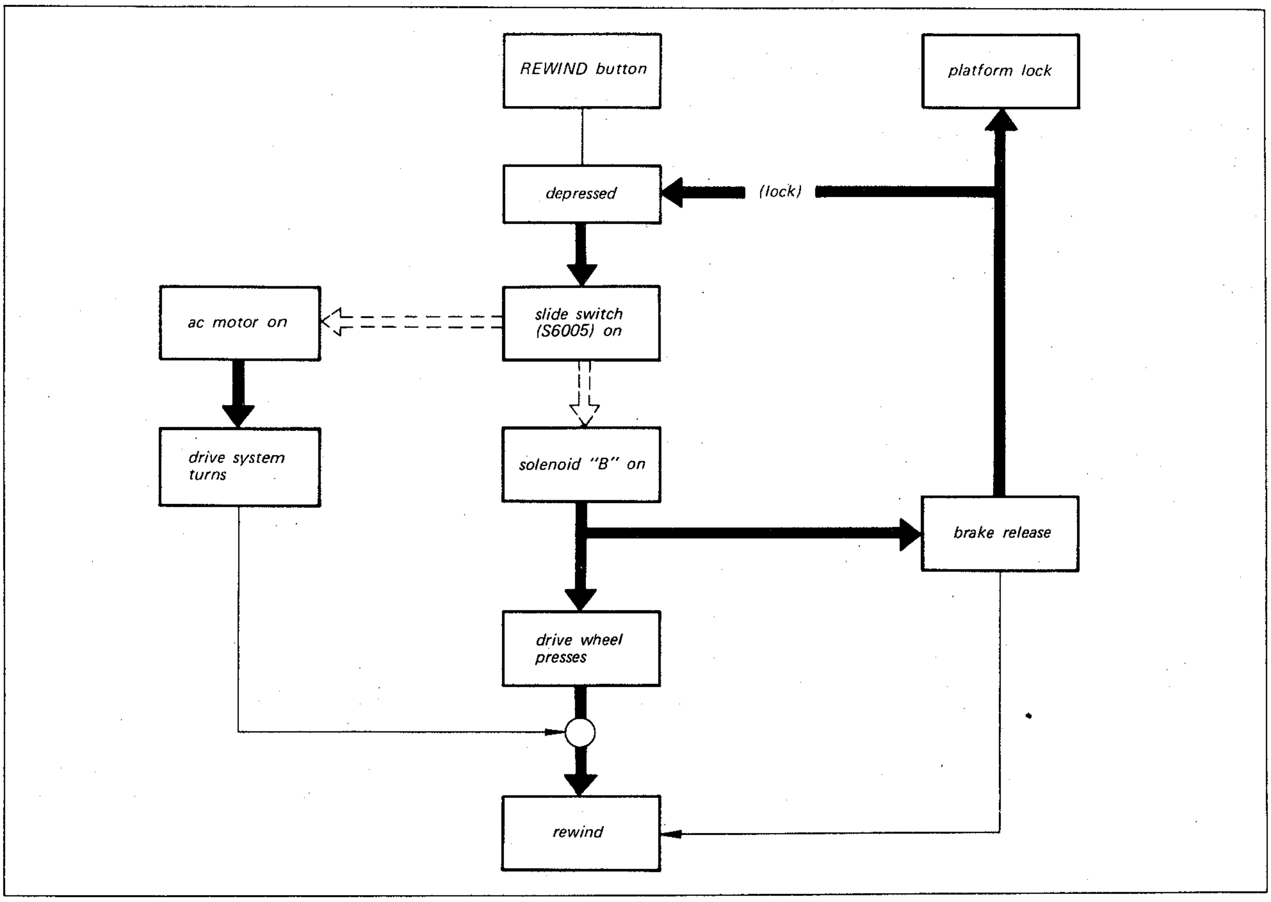

REWIND button
platform lock
depressed
(lock)
ac motor on
slide switch (S6005) on
drive system turns
solenoid "B" on
brake release
drive wheel presses
rewind

Fig. 2-5. Rewind sequence

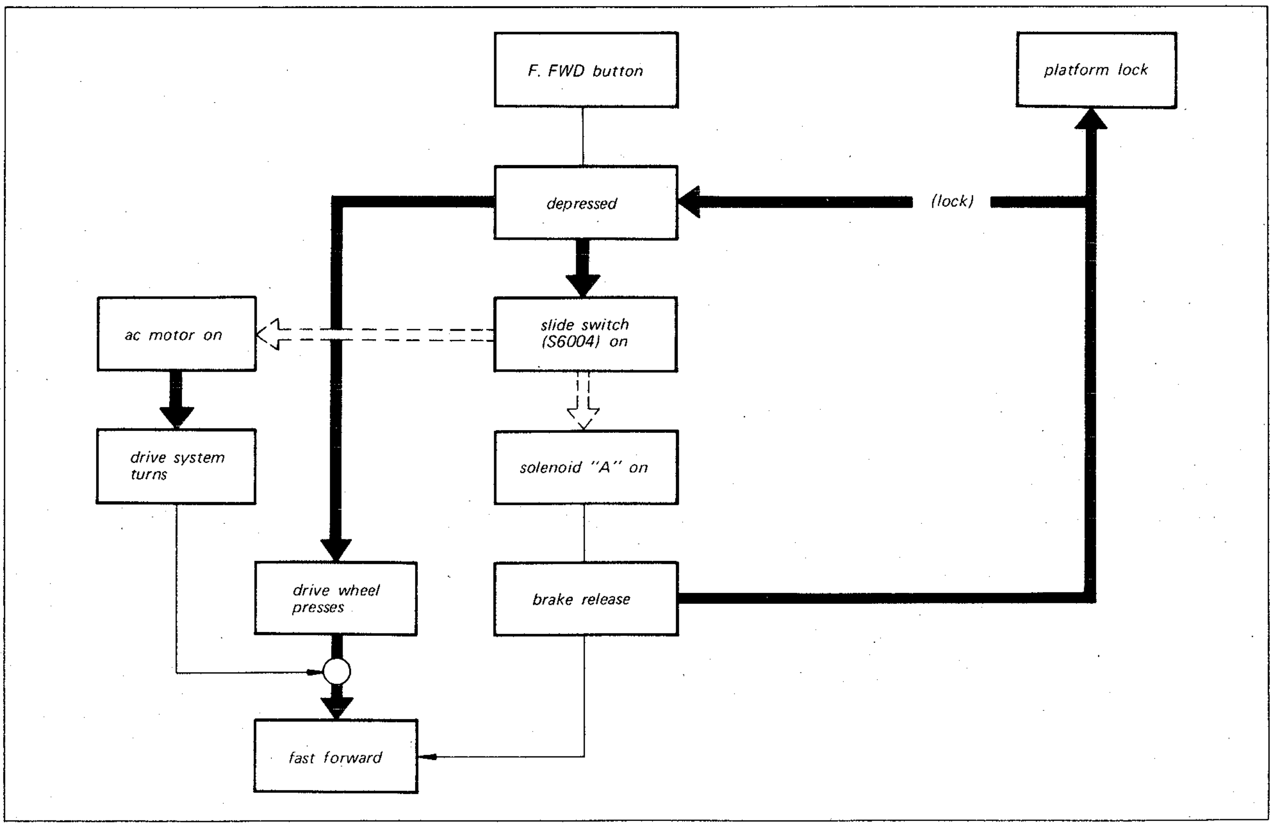

F. FWD button
platform lock
depressed
(lock)
ac motor on
slide switch (S6004) on
drive system turns
solenoid "A" on
drive wheel presses
brake release
fast forward

Fig. 2-6. Fast forward sequence

SECTION 3
CIRCUIT DESCRIPTION

3-1. GENERAL

Electronic circuitry in the VO-1600 is divided into seven major sections. These are video playback circuits, audio playback circuits, servo circuits, system control, VHF modulator, power supply and record pack.

Video processing during playback takes place in three printed circuit boards. Preamplification of video-head output as well as head switching and separation of r-f color and monochrome signals is accomplished in the B-R (R-F) board. The monochrome r-f signal is routed through the Dropout Compensator (K board) where dropouts are detected and r-f from the previous line is inserted to form a continuous r-f envelope. See Fig. 3-1 for locations of the printed boards.

Color and monochrome r-f signals are then routed to the A-R board for final processing. Here the frequency modulated monochrome signal is detected and the 688 kHz chrominance signals are restored to sidebands of 3.58 MHz. These signals are added to produce the NTSC-type output signal delivered to the VIDEO OUT connector and the VHF modulator.

Audio signal processing for both L and R channels takes place in the C-R board. This board contains preamplifiers, equalizer circuitry and line amplifiers that supply the audio output jacks and buffers to supply signals to the VHF modulators.

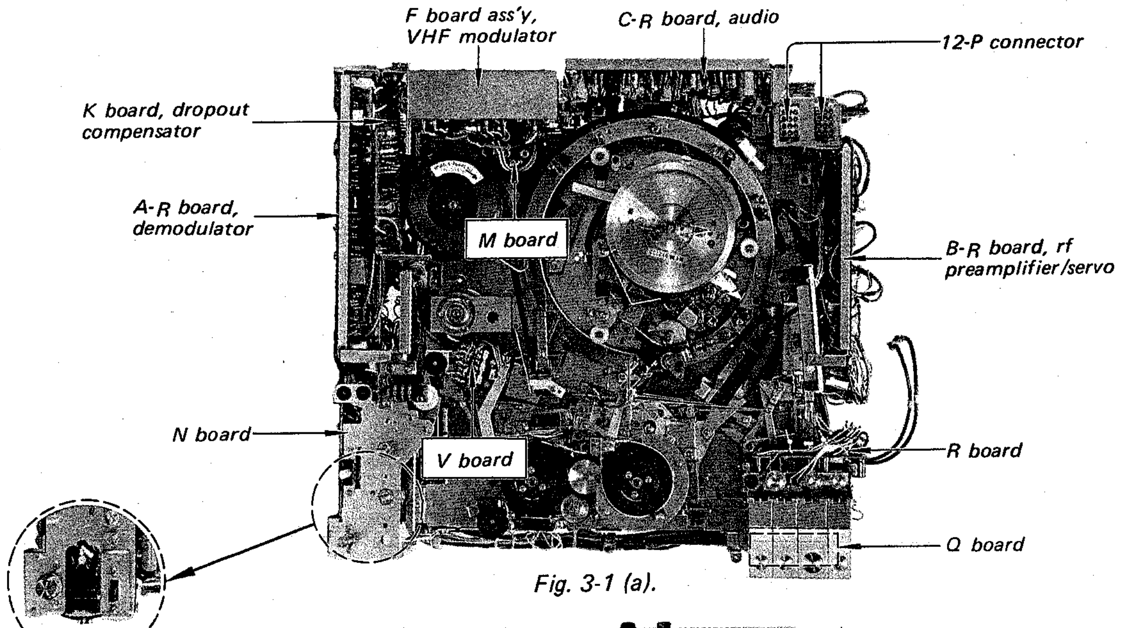

F board ass'y,
VHF modulator
C-R board, audio
12-P connector
K board, dropout compensator
A-R board, demodulator
M board
B-R board, rf preamplifier/servo
N board
V board
R board
Q board
Serial No. 11,001 and later

Fig. 3-1 (a).

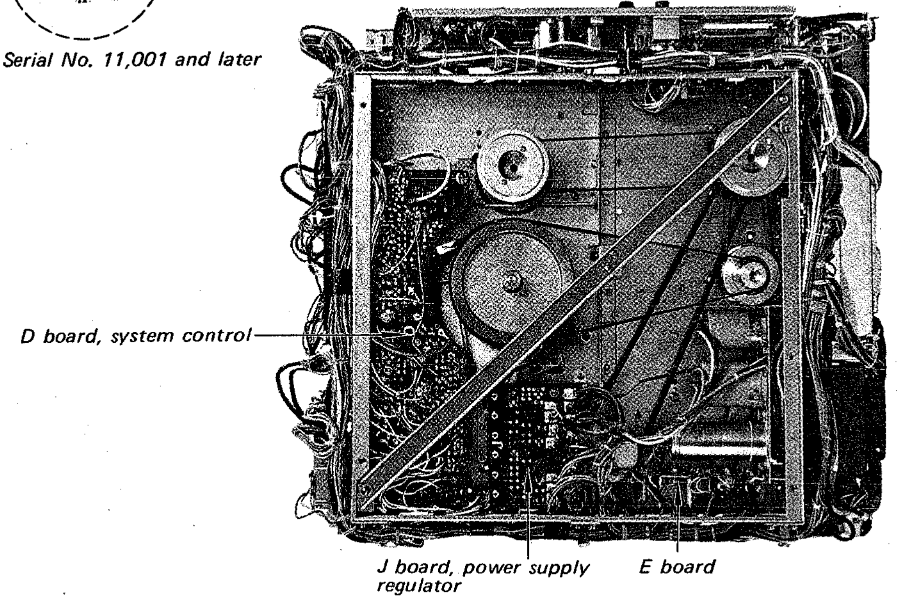

D board, system control
J board, power supply regulator
E board

Fig. 3-1 (b).

Microphone or AUX input signals are amplified for recording purposes in the H board. TV audio from the tuner is routed to channel 1 (R). In the sound-dub mode, audio from channel 1 (L) connectors is routed to the preamp. A separate E printed board houses the bias oscillator.

The servo circuits are on the B-R board. Both servo and r-f sections are mounted on the same B-R printed board. In the servo section playback control-track pulses are compared with pulses generated in the Rotary Head-Drum Assembly to control speed and positioning of the rotating video heads. In addition, 30 Hz pulses generated in the Rotary Head-Drum Assembly are used in the B-R board to establish the head-switching signal.

System Control, whose circuits are mounted on the D Board, controls tape threading and unthreading operations. It accepts manual commands to initiate Forward, Fast Forward, Stop, and Rewind modes of operation as well as automatic stop commands at either end of the tape. In addition, System Control regulates short duration automatic rewind operation to ensure resumption of play at the point of the tape where the Stop command was given and at the end of the tape to provide sufficient tape slack for threading operations.

The VHF modulator circuits are on the F Board which is fully enclosed in a shield box. This modulator accepts video and audio (L, R or mixed L + R) to amplitude modulate the video carrier and frequency modulate the audio carrier of channel 3 or 4. Channel selection is made at the rear-panel switch and control is achieved by switching tuned circuits by means of a polarity sensitive system using switching diodes.

The record pack combines a VHF/UHF tuner with the G, S and V boards that process input composite video prior to recording. The record pack can be separated from the main chassis mechanically. Electrical connections are made through multi-pin connectors. Signal processing consists of an AGC system, a precision FM modulator for the luminance signal, a color signal processor and the power amplifier to drive the video heads.

The power supply control circuits are mounted on the J Board with two series regulators mounted on heat sinks on the main frame. Separate regulators supply +12, +13, and +24 volts.

3-2. VIDEO PLAYBACK CIRCUITS

Video is recorded on the tape in the form of separate luminance (Y) and chrominance signals. The Y signal is frequency modulated using 3.8 MHz for the sync tip and 5.4 MHz for peak-white frequency. Chrominance signals consist of direct recording of color sideband signals that have been relocated to a carrier frequency (carrier suppressed) at 688 kHz. See Fig. 3-2. The playback circuit of the VO-1600 must amplify the outputs of the video heads and equalize playback characteristics to provide a flat response throughout the r-f spectrum. Following preamplification the 688 kHz chrominance signals are separated from the high-frequency fm Y signals and these are processed separately to receive the luminance signal and restore the chrominance signals to sidebands of 3.58 MHz. The system of chrominance recovery is insensitive to phase variations that result from time-base instability. Details of the circuit are as follows: Refer to the schematic diagrams in Section 11 as well as the block diagram in this section.

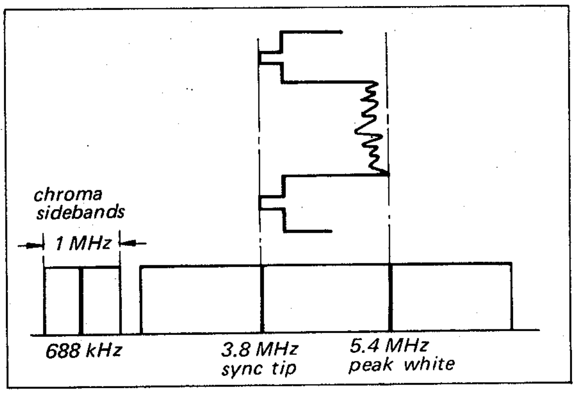


Fig. 3-2. Frequency range of rf signal

3-2-1. RF Preamp (B-R Board)

Video Heads A and B — The video heads are in contact with the tape in excess of 180° of rotation of the head-drum assembly both in the original recording and in playback. Thus the time duration of each swipe exceeds one field and an overlap time of signal exists while both heads are in contact with the tape as shown in Fig. 3-3 (a). To prevent crosstalk between the two tracks and to eliminate loss of information, the signals produced by each head are switched as shown in Fig. 3-3 (b). The signals are then mixed to provide a continuous r-f signal. Head switching takes place 6.5 H ahead of vertical sync.

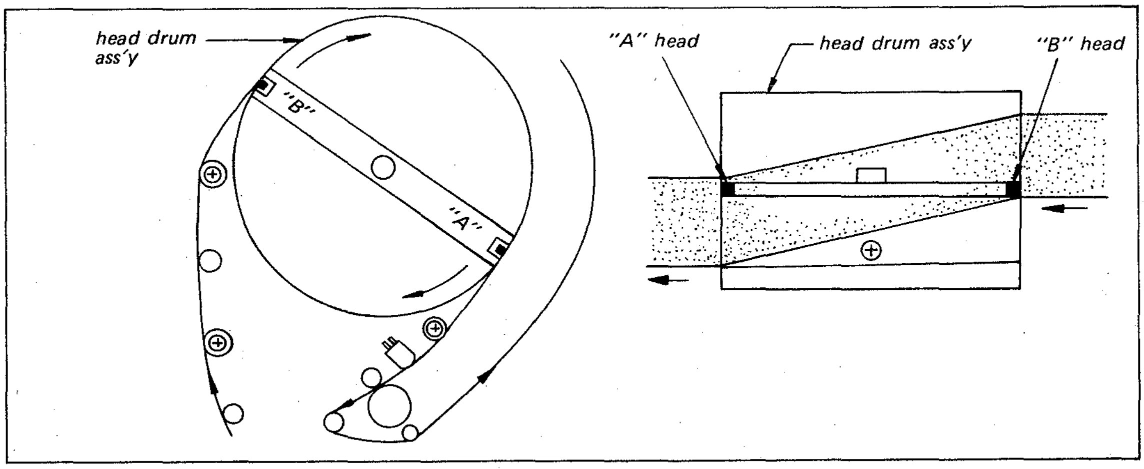

head drum ass'y
"B"
"A"
"A" head
head drum ass'y
"B" head

Fig. 3-3 (a). Overlapping condition

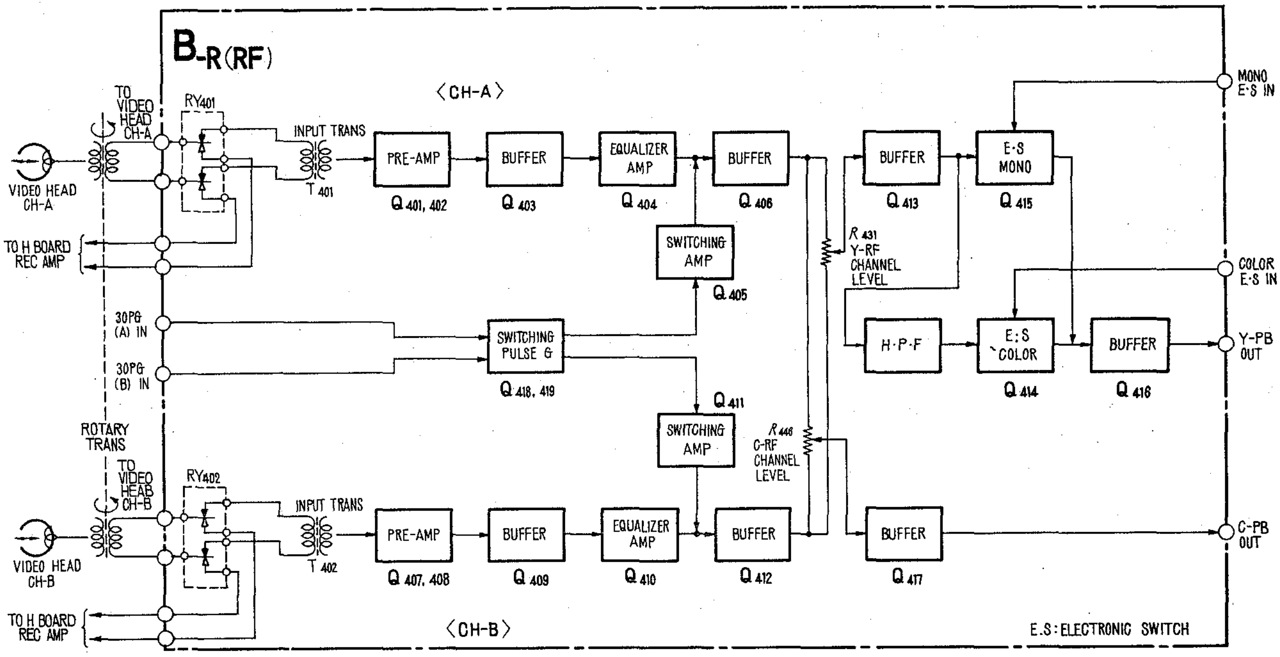

B-R (RF)
<CH-A>
TO VIDEO HEAD CH-A
RY401
INPUT TRANS
T401
VIDEO HEAD CH-A
TO H BOARD REC AMP
PRE-AMP
Q401, 402
BUFFER
Q403
EQUALIZER AMP
Q404
BUFFER
Q406
SWITCHING AMP
Q405
BUFFER
Q413
E·S MONO
Q415
MONO E·S IN
R431 Y-RF CHANNEL LEVEL
COLOR E·S IN
30PG (A) IN
30PG (B) IN
SWITCHING PULSE G
Q418, 419
H·P·F
E·S COLOR
Q414
BUFFER
Q416
Y-PB OUT
ROTARY TRANS
Q411
SWITCHING AMP
R446 C-RF CHANNEL LEVEL
TO VIDEO HEAD CH-B
RY402
INPUT TRANS
T402
VIDEO HEAD CH-B
PRE-AMP
Q407, 408
BUFFER
Q409
EQUALIZER AMP
Q410
BUFFER
Q412
BUFFER
Q417
C-PB OUT
TO H BOARD REC AMP
<CH-B>
E.S: ELECTRONIC SWITCH

Fig. 3-3 (b). Block diagram of head switching

Signals from the video heads are coupled out of the drum assembly by means of rotary transformers. See Fig. 3-3 (b). These transformers have primaries that rotate with the top of the head-drum assembly and stationary secondaries. Coupling is accomplished by a ferrite enclosure with very small flux gaps.

Input Transformers
T401, T402

Signal outputs of the rotary transformers are routed through the normally-closed contacts of the REC/PB relays RY401 and RY402. These relays are energized in the record mode to transfer the video head connections to the output of the record amplifiers (on the V board). In playback the r-f signal is applied to the primaries of

	matching transformers T401 and T402. The secondary circuits of these transformers tune the head inductance to the high end of the r-f passband.
Preamps Q401, 402 Q407, 408	These components form a low-noise Cascode amplifier using an FET to drive the emitter of a common-base amplifier.
Buffers Q403, 409	Emitter followers buffer the coupling between the preamp and the equalizer amplifier. Signal level at the output of Q403, 409 (TP401, 403) is about 80 mV.
Equalizer Amplifiers Q404, 410	Tuning and variable damping in the collector circuits permit adjustment of playback equalization. The signal path between the equalizer amplifiers and the output emitter followers contains the head switching transistors
Switches Q405, 411	Q405 and Q411. These transistors are driven alternately into saturation to short the signal path to ground. The switching signal is a 30 Hz square wave developed by the bistable multivibrator Q418 and 419. Signals developed by two 30 PG coils mounted on the Rotary Head-Drum Assembly switch the multivibrator so that each playback channel is turned on during the time that the head is making its pass. The on interval begins 6.5 H before vertical sync and ends at the same time during the next field.
Buffers Q406, 412	Emitter followers Q406 and 412 isolate the switches from the balance controls and provide a low impedance source of signal for the parallel-connected balance controls.
Balance Controls R431, R446	The Y (rf) and chrominance balance controls, R431 and R446 add and balance the output of the A and B amplifier channels. They are adjusted for equal envelope amplitude inputs to both the Y (rf) and chrominance processing circuits.
Buffer Q413	Q413 serves as the low impedance source of signal for two signal paths. One path of signal includes a high-pass filter. This path is used when a color recording is played back. The filter eliminates crosstalk between chrominance signals and lower-sideband fm signals. The remaining output of Q413 feeds directly to electronic switches via C419.
Electronic Switches Q414, Q415	These transistors operate as series-connected SPDT switches with inputs at the collectors and a common output at the emitters. They select direct or filtered r-f for output to the demodulator section. The switches are actuated by bias applied to the bases of the switching transistors. Switching bias is determined by the presence of burst in the recorded signal as will be explained in detail later.
Buffer Q416	Buffer Q416 supplies Y r-f output signals to the limiters on the K Board. R445 determines input signal level which is set to about 200 mV (p-p).
Buffer Q417	Buffer Q417 supplies chrominance r-f output signals to the A-R Board.

3-2-2. Dropout Compensator (K Board)

The Dropout Compensator works in the Y r-f section. It develops a direct and a one-H delayed r-f signal. Should a dropout occur that is 26 dB below envelope peak level, a pulse is developed that is equal in time duration to the dropout. The pulse is used to switch in the delayed r-f signal. Thus, the r-f from the previous line is switched in to occupy the time interval during which the dropout occurs.

Limiters Q501, 502 D501-504	Input from the B-R board is first applied to two cascaded limiters. The diodes perform symmetrical limiting with Q501 and Q502 providing interstage amplification.
Buffer Q503	Emitter follower Q503 supplies limited r-f signals to the mixer balance control and the envelope detector.
Envelope Detector Q504	The r-f output of Q503 drives Q504 which is biased for nonlinear operation to operate as an amplitude detector. Dropouts appear in the base circuit as serrations in the r-f envelope. They appear in the collector circuit of Q504 as positive pulses whose amplitude is proportional to the "depth" of the dropout.
Schmitt Trigger Q506, 507	Dropout signals developed by Q504 are applied to the input of a Schmitt trigger which acts as an amplitude sensor. Bias on this circuit is adjusted by R520 so that dropouts that are deeper than 26 dB from peak envelope level will switch on the Schmitt trigger. This yields a positive pulse of fixed amplitude at TP-503 each time a dropout larger than the threshold occurs. Pulse width is as wide as the dropout.
V Blanking Gate Q505	The blanking gate shorts the envelope detector to ground for the duration of the 60 PG pulse to disable the circuit during the head-switching interval.
Pulse Shaper Q508	Positive pulses from the Schmitt trigger are amplified by Q508 to drive the Dropout Gate. This circuit provides switching pulses of equal amplitude and opposite polarities. (Positive at the emitter and negative at the collector).
Buffer Q510	R-f signal output of Q 503 is fed through R542 to the output emitter follower Q510. This is the normal route for signal in the absence of dropout. Q510 feeds corrected signal to the A-R board for demodulation.
1H Delay Line DL501	It also feeds signal into the 1H delay line for storage should a dropout occur on the following line. The delayed signal is amplified by Q509 and applied to an additional diode limiter. Limiter output is applied to the diode switch D508-D511. The diodes in this group are normally conducting, which returns the delayed r-f signal to ground via C524. During a dropout the pulse output of Q508 cuts off all diodes and the ground is lifted from the delayed signal path.
Mix Balance R542	This control balances the direct feed against the delayed feed to provide an r-f envelope of uniform amplitude through the dropout interval.

3-2-3. Signal Processing (A-R Board)

Demodulation of the fm signal, restoration of the chrominance signals to 3.58 MHz, Y and C mixing, and signal muting takes place on the A-R board.

Playback/E-to-E switches Q532, Q533	These transistors act as SPDT switches and select the signals to be demodulated. Note that Q533 is forced into conduction in playback mode only, delivering signals from K board, while in E-to-E or record mode, Q532 is turned on routing the Y recording signals from G board for monitoring use.
Limiters IC501	R-f input from the K board is applied to IC501 which functions as a multi-unit differential limiter.

Carrier Balance R667	R667 is adjusted to balance the limiter to preserve waveform symmetry. It is adjusted for minimum carrier leak in the output video.
Detector Driver Q534	Q534 amplifies the output of the limiter to drive the fm detector circuit. The signal applied to the coupling transformer is differentiated by L510 to form spikes that correspond to the leading and trailing edges of the square-wave output of the limiters.
Fm Detector Q535, Q536	The fm detector functions as a full-wave rectifier/amplifier. It produces two negative pulses per cycle of input signal. In this way the detector doubles the carrier (ripple) frequency and puts it outside the passband of the low pass filter FL503.
Low Pass Filter FL503	The low pass filter acts to integrate the detected pulses and provides an output proportional to pulse density. The maximum negative output occurs at the highest frequency. Thus peak white appears as the most negative-going signal.
Carrier Balance R678	R678 balances the output of the detector for minimum carrier leak.
Y Level R681	R681 sets the level of detected Y signal that appears at the output terminal. It is adjusted for 1V (p-p) at the terminated VIDEO OUT (Monitor) connector.
Video Amplifier Q537	Output of R681 is amplified by Q537 to the level required at the output terminals. C610, R687 and R685 provide de-emphasis.
Buffer Q538	Q538 serves as a buffer to provide a low-impedance source of signals to three signal paths. One feed is to a sync separator from which a burst-keying pulse is ultimately generated.
Electronic Switch Q539	The signal path for monochrome operation is through Q539, a series-connected switch. The switch is on if there is no burst in the playback signal. The Y signal is fed through Q539, C616, C624, and R711 to the base of Q544. This emitter follower supplies video to the VHF Modulator via C628.
Buffer Q544	Q544 also supplies signal to Q545, another emitter follower that supplies signal to the VIDEO OUT (Monitor) connector. The diode clamp D531 in the base circuit of Q545 clips spikes from the most negative-going part of the signal to provide clean sync in the video output signal. The remaining path for signal supplied from the emitter of Q538 is through delay line DL502. This signal is mixed with 3.58 MHz chrominance signals across R701. Any residual 3.58 MHz signal in the Y signal is removed by trap L511 and C617 before the Y and C signals are added.
Y/C Mixer Q541	Mixed Y and C signals are amplified by the common-base amplifier Q541.
Buffer Q542	Buffer Q542 supplies composite NTSC-type signal to the chrominance section of the electronic switch. If burst is present in the playback signal, Q540 is turned on and Q539 is off.
Y Mix Level R708	R708 adjusts the level of Y signal in color operation to match that of the Y signal in monochrome operation.

3-2-4. Color Signal Processing

A simplified block diagram of color signal processing is shown in Fig. 3-4. Playback chrominance signals consist of sideband information grouped on both sides of a 688-kHz center frequency. These signals are subject to frequency and phase errors introduced by minute time-base errors inherent in video tape recorders. The basic idea is to beat the 688-kHz sidebands against a 4.27-MHz source that has identical frequency and phase errors. The result is a constant difference-frequency centered about the NTSC subcarrier frequency of 3.58 MHz. The 4.27-MHz signal used in the frequency converter is developed in the lower line of blocks shown in Fig. 3-4. First the 688-kHz signal is converted to 4.27 MHz. This signal is then sent to a burst separator where a 4.27-MHz burst signal is extracted. Phase comparison between the final 4.27-MHz CW signal and 4.27-MHz burst (which contains the frequency and phase errors) takes place in the phase detector. This detector produces an error signal to control the phase of a voltage-controlled 688-kHz oscillator.

Response of this system is fast enough so that it can follow phase errors introduced in playback. The 688-kHz signal produced in the voltage controlled oscillator is converted up to 4.27 MHz by mixing the 688-kHz signal with a feed from the local 3.58-MHz oscillator. Details of color processing are as follows:

Playback/E-to-E switches Q511, Q512	These transistors act as SPDT switches and select the signals to be demodulated. Note that Q511 is forced into conduction in playback mode only, delivering signals from B-R board, while in E-to-E or record mode, Q512 is on, routing the chrominance recording signals from G board for monitoring use.
Low Pass Filter	Input signals from the B-R (R-F) board are sent through a low-pass filter consisting of L503 and L504 and the capacitors C531 through C532 and C533. This filter separates 688-kHz chrominance signals from the frequency modulated Y signal. Frequency cut-off is 1.4 MHz.
688-kHz Color Level R555	R555 determines the signal output to the color processing system. It is set for 0.47V(p-p) at TP-506.
Color AGC Q514	A fast acting color AGC system is used at this point to maintain a constant chrominance level despite differences in video head output. This is required to eliminate 30 Hz flutter in chrominance. Q514 is the gain control element. Its source-to-drain impedance forms a voltage divider with the series resistor R561. The impedance of Q514 is, in turn, controlled by a voltage doubler rectifier D512 and D513.
Burst detector D512, D513	This circuit is driven from the burst gate and provides a positive output voltage proportional to burst amplitude.

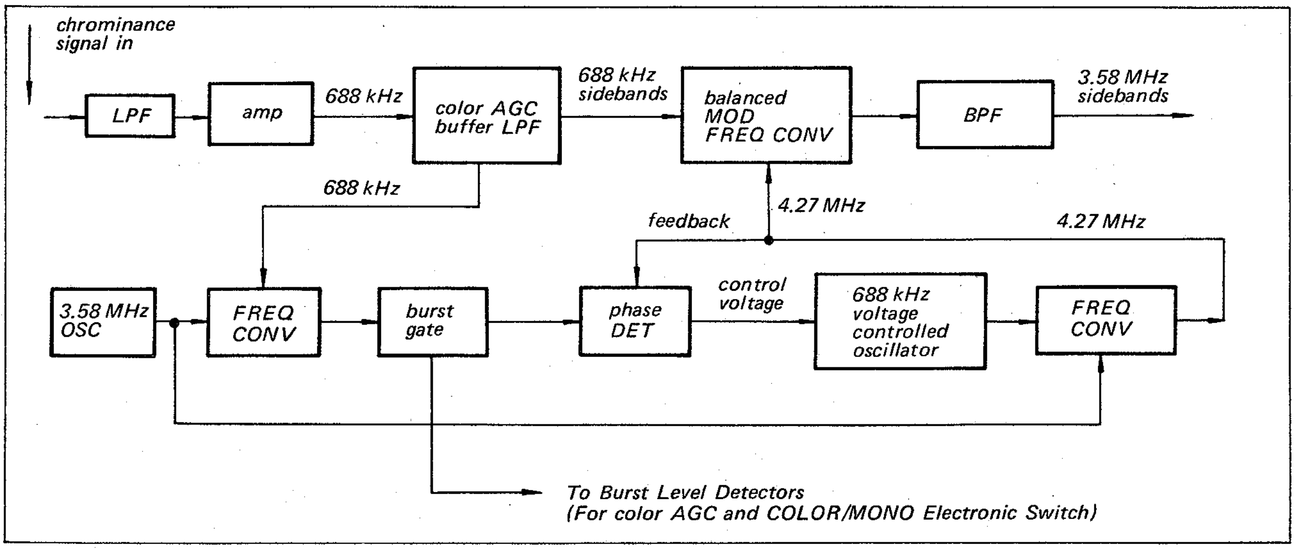

chrominance signal in
LPF
amp
688 kHz
color AGC buffer LPF
688 kHz sidebands
balanced MOD FREQ CONV
BPF
3.58 MHz sidebands
688 kHz
4.27 MHz
feedback
4.27 MHz
3.58 MHz OSC
FREQ CONV
burst gate
phase DET
control voltage
688 kHz voltage controlled oscillator
FREQ CONV
To Burst Level Detectors
(For color AGC and COLOR/MONO Electronic Switch)

Fig. 3-4. Color playback system simplified

A positive voltage at the gate of Q514 reduces the source-to-drain impedance and the output signal voltage developed at the junction of R561 and Q514.

The color AGC system is disabled during the vertical blanking interval (no burst during this period) by a separated vertical sync pulse applied to the AGC detector output via R649.

Color AGC Control
R566

R566 sets the bias on Q514 and determines AGC range. It is set for 1.1V (p-p) at TP-508.

Amplifier
Q515

Amplifier Q515 follows the gain control element to restore signal amplitude to the value required in the frequency converter. A low-pass filter in the coupling circuit to Q516 cuts off at 1.5 MHz to eliminate crosstalk components above the chrominance range.

Buffer
Q516

Emitter follower Q516 is a buffer for the low-pass filter and provides a low-impedance source of signal to two frequency converters. One converter is used to generate the 4.27-MHz signal from separated burst. The remaining converter, D514 through D517, beats the sidebands of 688 kHz against 4.27 MHz to provide sidebands centered at 3.58 MHz. The system for local generation of the 4.27-MHz signal will be described next.

Frequency Converter
Q521

Q521 acts as a mixer. It is biased for nonlinear operation, has the 688-kHz signal applied to its base and a CW signal from the local 3.58-MHz oscillator applied to its emitter. A bandpass filter in the collector circuit of Q521 separates the sum frequency from the convertor products.

Subcarrier Oscillator
Q519

Frequency Adjust
C553

A stable source of 3.58 MHz is provided by crystal oscillator Q519. The oscillator is free running and C553 is adjusted to provide correct subcarrier frequency.

Buffer
Q520

Q520, an emitter follower, isolates the oscillator from the frequency converter.

4.27 MHz Amplifier
Q522

Output from the bandpass filter is amplified by Q522 to drive the burst gate Q523.

Burst Gate
Q523

Signals applied to the base of the burst gate are 4.27-MHz chrominance and a gating pulse generated from separated and delayed horizontal sync. An RC network in the emitter leg maintains a signal bias beyond cutoff so that the stage comes into conduction during the gate pulse interval only. The separated burst signal at the collector of Q523 is proportioned in amplitude to playback chrominance and contains the frequency and phase errors of the playback signal. The burst gate feeds three circuits: the phase detector and two level detectors. The first level detector (D512, D513) has been described previously in conjunction with the chroma AGC system. The second level detector (D527, D528) drives the mono/color mode switch.

Phase Detector
D518, D519

The phase detector compares a push-pull feed of separated burst at the secondary of T503 with a sample of the locally generated 4.27-MHz CW signal applied at TP-528. The result is a dc correction voltage whose magnitude is proportional to phase error. This error voltage is filtered by a low-pass filter C572, R615 and C573.

4.27 MHz Level Adjust R612	R612 sets the level of CW signal applied to the phase detector. It is set for an ac level of 2 V (p-p) at TP-528.
Detector Balance R726	R726 balances detector output for zero error when a correctly-phased chrominance signal is applied.
Buffer Q546	Detector output is buffered by FET amplifier Q546 to isolate the detector from the low impedance of the forward-biased diode frequency-control component.
Voltage Controlled Oscillator Q547	Q547 is a Colpitts type oscillator operating at 688 kHz. Frequency control is achieved by a voltage-variable impedance in series with C631, C632. This impedance is the forward resistance of D536 whose dc operating point is controlled by Q546.
Limiter D532 - D535	This limiter system in the gate circuit of Q546 limits the range of oscillator control to prevent excessive excursions during tape start up.
Oscillator Bias R752	R752 sets the rest bias in the oscillator to obtain a signal frequency of 688 kHz.
Buffer Q548	Emitter follower Q548 isolates the 688-kHz oscillator from the mixer circuit that follows.
Frequency Converter Q549	Signal output from the 688-kHz oscillator is applied to the emitter of Q549 and a feed from the 3.58-MHz crystal oscillator is applied to the base. The sum frequency, 4.27 MHz, is tuned in the collector circuit and applied to the 4.27-MHz amplifier Q550. Filters in the collector circuit remove all mixer output components except the 4.27-MHz signal.
Detector Driver Q517	CW signals at 4.27 MHz are amplified by Q517 to drive the frequency converter D514 – D517.
Frequency Converter D514 – D517	A feed from Q517 is also applied to the phase detector through C571 and R612 to provide the feedback signal for phase comparison. The frequency converter acts as a balanced modulator with 688-kHz chrominance signals applied from the centertap in T501 and ground. CW signal at 4.27 MHz is applied at the primary of T501. The balanced modulator transfers color sidebands centered at 688 kHz to sidebands centered at 3.58 MHz. The CW input at 4.27 MHz is suppressed by balanced operation. The bandpass filter FL501 passes the 3.58-MHz signals and rejects the remaining converter products.
Buffer Q518 Chroma Level R581	Emitter follower Q518 provides drive for the chroma/Y mixer. Chrominance level in the output signal is determined by the setting of R581. Mixing of the Y and C components at Q541 takes place across R701. From this point to the output jacks the signal takes the paths that have been described previously.
Sync Separator Q525 – Q527	Sync is separated from a sample of the video output signal to supply burst keying pulses to the burst gate and vertical blanking signals to the chroma AGC system. A sample of the video output signal is taken from the emitter of buffer Q538 and applied to the base of Q525 through a low-pass filter that removes high-order harmonics and video signals. The three stage separator provides composite negative-going sync at the collector of Q527. This signal is applied to a low-Q series resonant circuit consisting of R641, L509 and

	C585. Horizontal sync pulses cause the tank circuit to ring for about 1-1/2 cycles and frequency is chosen so that the peak of the first half cycle coincides with burst timing. The signal so developed across C585 is applied to the burst gate as the gating pulse.
Vertical Sync Separator Q528	A feed of separated sync from the collector of Q527 is applied to a two-section integrator R643/C587, R644/C588 to separate the vertical sync component. This signal is applied to the vertical sync separator Q528.
Color/Monochrome V Sync Level R647	Emitter bias on this stage is set by R647 so that blanking pulses at the collector are of the correct level to maintain a constant AGC level through the vertical blanking interval.
Color/Monochrome Electronic Switch D527, D528 Q529 – Q531	Burst is rectified by the voltage doubler D527, D528 to provide a positive dc voltage at TP-535 when burst is present in the playback signal. This sets the three stage direct-coupled switch as follows: Q529 ON, Q530 OFF, Q531 ON. The dc voltages that result at TP-519 (+16.5V) and TP-520 (+0.06V) set up color operation. In this case the Y fm signal is routed through a high pass filter in the B-R (R-F) board and the Y/C mixed output signal is selected by turning on Q540. If there is no burst signal in the playback signal the voltages at TP-519 and TP-520 reverse and the monochrome mode is selected. In this case the Y fm signal bandwidth is not restricted and video signal flow is through Q539.
Monitor Select Switch S6014	The Monitor Select Switch permits override of the electronic switch if a monochrome monitor is used for display purposes. The system works normally in the COLOR MONITOR position but monochrome operation is selected regardless of the type of signal played back if the switch is set to B/W MONITOR.
Video Muting Q543	Transistor Q543 shorts the base of Q544 to ground to eliminate video output signals during tape threading operations and during playback until control track pulses have been detected (indicating normal tape speed). The control voltage for Q543 is developed in D (system control) and B-R (servo) boards.

3-3. SERVO CIRCUITS (B-R Board, Servo)

VO-1600 employs a braking-type servo to control video head-drum rotation (tape speed is fixed). In playback, when the track for field 1 of a prerecorded frame comes into position for playback on the head-drum assembly, a control track pulse is read out at the control track head. This event is compared in time with a 30 PG pulse generated in the head-drum assembly that signals the position of the A video head. If the head is early, (head drum speed too high) the result of the pulse comparison increases braking current to retard head position. Late head arrival triggers the opposite effect. In the record mode, separated sync obtained from the input signal serves as the timing reference for the servo system. The servo employs two feedback loops, one of which integrates jitter in the playback control-track pulses.

In addition to servo control of the rotary head drum assembly, the servo system performs the following auxiliary functions; 30 PG pulses 180° apart for playback preamp switching, manual tracking control, blanking pulses for the drop-out compensator, detection of control track signals for video muting.

Details of the system are as follows:

CTL Amplifier Q1 – Q3	The control track preamp is set up as a nonlinear amplifier. Direct current feedback from the emitter of Q2 through D1 to ground main-

tains a bias on Q1 that is very close to cutoff. Thus negative CTL spikes have no effect upon the output Q1 but positive spikes drive the transistor into conduction (Signal level at this point is far too small for D1 to act as a rectifier. Q2 amplifies the negative pulses produced by Q1 to drive the final unbiased amplifier Q3 into conduction. Thus the signal produced at TP-2 is clean negative pulses at about 5.8V (p-p).

The CTL signal at TP-2 is applied directly to the monostable multivibrator IC2-C when the TRACKING control is off.

The CTL signal at TP-2 is also applied to a variable-delay system that delays the signal 1/30th of a second ±8m sec to provide variable tracking. The tracking control switch selects either direct CTL feed or the output of the tracking-delay multivibrators.

Tracking Control Multivibrators IC-1B and C

Delay Adjust R17

Bias Source Q5

Delay Adjust R20

Total delay is provided by two monostable multivibrators in cascade, IC1-B and C. Both MMV's are contained in the same integrated circuit. The first delay multivibrator is triggered by a negative CTL pulse coupled through D3. This cuts off the right hand transistor in the schematic and initiates the unstable state. The cut off interval for this transistor is determined by the time it takes for C12 to dump its charge through R17. This resistor is adjusted to provide part of the total delay. At the end of the unstable state a negative pulse from IC1-B triggers the third MMV IC1-C. This MMV functions in the same way except that the RC network that determines the duration of the unstable state is returned to a variable bias source at the emitter of Q5. The voltage at the emitter of Q5 is controlled by a voltage divider in the base circuit that includes the front-panel TRACKING control. R20 controls the range of the total time delay to provide an adjustable CTL pulse that straddles the correct time of arrival by approximately ±8m sec.

Ramp Multivibrator IC2-C

Slope Adjustment R37

Fixed or variable-CTL pulses are applied to monostable multivibrator IC2-C. This Multivibrator generates a pulse to be formed into a sampling ramp in the next stage. The duration of the pulse is controlled by R37. Since this pulse will control the run down interval in the ramp generator, R37 acts to control the slope of the ramp. It is set for a slope of 0.5V per millisecond.

During record operations, vertical sync from the G board is applied through D7 to trigger the ramp generator.

Miller Integrator Q7

Sampling Hold Gate Q8

During the active interval for Q7 that is initiated by the rectangular drive pulse, a negative-going ramp is generated. The amplitude of this ramp is sampled by the Sampling-Hold Gate Q8. This transistor acts as a switch that is turned on by a delayed 30 PG pulse that signals the start of the pass made by the "A" video head. During the 30 PG pulse interval, Q8 is effectively shorted from collector to emitter and C28 charges to the value of the ramp. At the end of the 30 PG pulse Q8 opens and C28 holds the charge until the next 30 PG pulse. Thus the voltage stored across C28 is determined by instantaneous head position. If the video head is early, the ramp is sampled at a higher amplitude and the voltage across C28 increases. This in turn, will result in increased brake current. The system reaches equilibrium when the heads track precisely over the prerecorded tracks.

Sampling Hold Pulse Amplifier Q9

Q9 amplifies the delayed 30 PG pulse to drive the Sampling Hold Gate.

DC Amplifiers Q10 – 12

Transistors Q10 and Q11 are connected in the Darlington configuration to prevent loading of the sampling-hold capacitor C28. Q12 acts as a power amplifier that supplies brake current. The brake, L6003, operates as a squirrel cage motor with a stationary field. An increase in dc coil current acts to brake the rotor that is secured to the shaft of the rotary head drum assembly.

30 PG Coil A L6005

The feedback pulse that signals the pass of the A video head is generated by 30 PG Coil A. A direct current flows in the coil and when the iron vane fastened to the rotary head drum assembly sweeps past the coil, a sine-wave shaped signal is developed.

30 PG Pulse Amplifier Q6

The positive part of this waveshape drives Q6 into conduction generating negative pulses at the collector. The pulses so generated are delayed in the two cascade multivibrators that follow.

30 PG Delay Multivibrator IC2-A

The first 30 PG delay is very short and has little effect on the phasing of the system (i.e. the lead or lag of a video head with respect to the sampling ramp). The purpose of the short delay is to set the switching point precisely so that head switching from B to A heads, takes place 6.5 H ahead of vertical sync. The delay inserted by IC2-A is determined by the discharge time of C19 through R31 and R32. R31 is set for the condition noted above. The delayed pulse developed at TP-6 is fed out to the B-R (R-F) board to trigger the head switching multivibrator described earlier.

Switching Position Adjustment R31

30 PG Delay Multivibrator IC2-B

The second delay multivibrator IC2-B, injects a much longer delay and is set to place the 30 PG switching pulse at the correct position on the sampling ramp.

Lock Phase Adjustment R34

The delay injected by IC2-B is determined by the time taken for C21 to dump its charge through R35 and R34. The latter is adjusted to place the 30 PG pulse 450 μsec after the start of the sampling ramp.

Note that R34 is not returned to +B but to a variable source of positive voltage found at the emitter of Q18. The voltage at this point is produced by a closed loop system that acts to integrate jitter in the playback control track pulses due to residual wow and flutter in the tape transport. The closed loop system functions as follows: A pulse feed from IC2-B is integrated by R70 and C42 and applied as a steep ramp to sampling-hold gate Q16. This gate is switched on by the control track pulse found at the input to IC2-C. Thus C43 charges and stores a dc signal proportional to control-track pulse jitter. Since C43 is quite large, the jitter component is integrated over a long time interval. The voltage so produced is buffered by Q18 to control the delay of the 30 PG pulse in IC2-B. In this way the 30 PG pulse is delayed to coincide with the average position

Sampling-Hold Gate Q16

	of the control track pulses and the effects of rapid jitter are minimized. Diodes D12 and D13 establish correct operating points during tape start up.
30 PG Coil B L6006	The second 30 PG Coil (B) is mounted 180° from Coil A on the rotary head drum assembly. It generates a pulse as the B video head enters the tape path. This pulse is not utilized in the servo system but is used to trigger the head switching multivibrator and to generate the blanking pulse for the dropout compensator.
30 PG Pulse Amplifier Q4	Pulse amplifier Q4 amplifies the 30 PG (B) pulse to produce negative pulses. These are coupled to the Dropout Compensator (D.O.C.) multivibrator and delay multivibrator Q13, Q14.
30 PG (B) Delay Multivibrator IC1-A	This delay multivibrator operates in the same fashion as IC2-A. It generates the head switching pulse that achieves head switching from A to B. Its delayed output pulse is applied to the head-switching multivibrator in the B-R (R-F) board.
30 PG Delay Adjustment R14	R14 adjusts the delay of IC1-A so that head A to B switching occurs 180° from the B to A switch.
D.O.C. Multivibrator Q13, Q14	The D.O.C Multivibrator generates a 60 Hz blanking pulse that disables the dropout compensator during the head-switching interval. Alternate switching from pulses supplied by both A and B 30 PG coils trigger the multivibrator at 60 Hz. Diodes D9 and D10 isolate the two 30 PG trigger circuit from one another.
PB Muting Q19 – Q21 D14 – D16	The muting system generates a positive voltage to mute both audio and video circuits during threading and unthreading operations. In addition, video circuits are muted until tape comes up to speed and a correct picture can be displayed. The latter is accomplished by detecting the presence of playback control-track pulses. Audio is not muted by the CTL detector so that the operator may use the machine to playback audio recordings that are not accompanied by video. During threading and unthreading, a positive voltage is supplied from system control to pin 12 of the B-R board. This signal is coupled through D14 to turn on Q19. This effectively grounds the base of Q20 to cut off this transistor. Collector voltage at about +8 volts is supplied to the audio circuits, and through D15 to the video circuits. Muting extends past the cycling time for the tape threading mechanism by the time taken for C47 and C48 to discharge after removal of the voltage supplied by system control.
PB Muting Time R79	R79 adjusts this time extension to ensure correctly synched pictures when muting is removed.
PB Muting, Video Q21	Q21 is cut off and the muting voltage at the collector is coupled through D16 to the video circuits. Diode D15 prevents the audio circuits from being muted from this source. When control track signals are received, signals at pin 11 of IC1-B turn on Q21 to remove the muting voltage.

3-4. RECORD VIDEO CIRCUITS (G and V board)

Recording circuits in the VO-1600 process the composite video signal to drive the video heads. Processing consists of first separating luminance and chrominance components. Thereafter the luminance signal is applied to a frequency modulator and the chrominance sidebands are shifted from a center frequency of 3.58 MHz to a new center frequency at 688 kHz. The fm video signals and the 688-kHz chrominance signals are added and applied to the rotating video heads. Linearity is preserved in the direct recording process used for the chrominance signals because the luminance fm signal acts as ac bias.

In addition to basic processing, the following auxiliary functions are performed; luminance and chrominance AGC, automatic switching of luminance bandwidth to suit monochrome or color input signals and sync separation. Separated sync is used to render the luminance AGC system insensitive to picture content, provide a delayed burst gate and supply a timing reference for the servo system during the record mode.

All video signal-processing circuits for record operations are mounted on the G Board. The output circuits that drive the video heads are mounted on the V Board.

Circuit details are as follows:

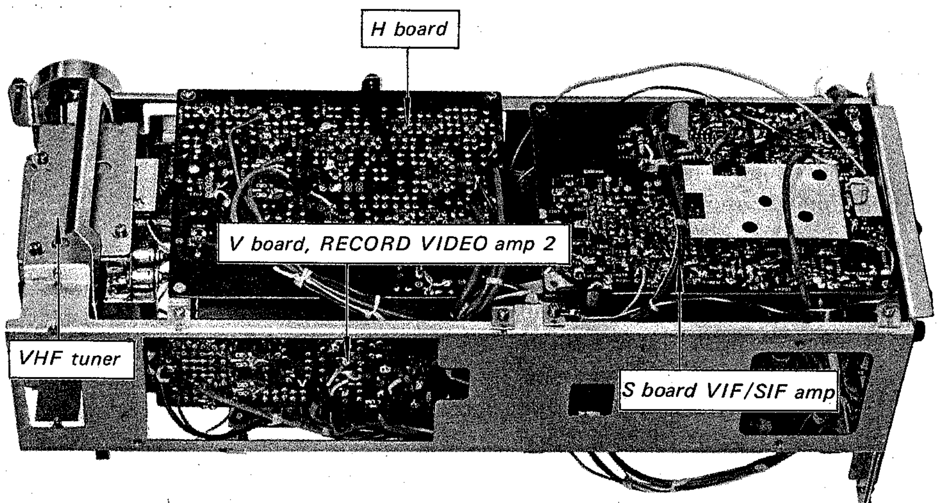


Fig. 3-5. Printed circuit board location (a)

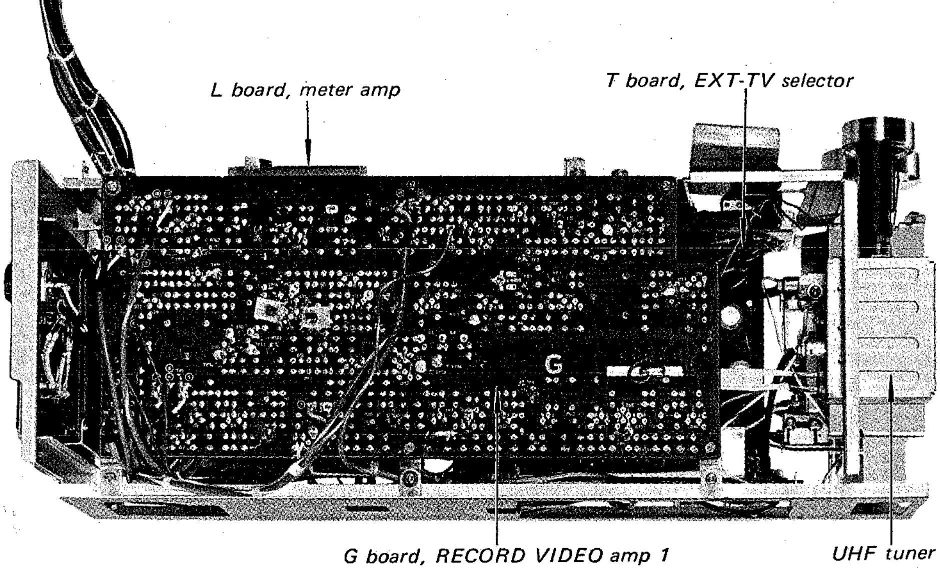


Fig. 3-5. Printed circuit board location (b)

S6201

The source of video to be recorded is selected by S6201. It selects the signal applied to the rear panel VIDEO IN receptacle or the output of S board.

Buffer Q1 and Q2

Q1 reverses the polarity of the input signal from S board and slightly reduces its level to obtain standard video signal. The tank circuit L1 and C3 in the collector circuit of Q1 is tuned to the high end of the video bandpass to compensate for the slope of the i-f characteristic. Q2 serves as an emitter follower to supply a low-impedance source of video to the input selector. Signal from S6201 (measured at TP-1) is routed to the luminance processing circuitry, the chrominance processing circuitry and the sync separator system. The text follows those branches in the order given.

AGC Control Q9

Luminance signal is applied first to an AGC control stage Q9, to provide a constant input level to the modulator regardless of variations in input signal level. AGC control is accomplished by voltage divider action using the series resistance of R33 and the output impedance of FET Q9.

AGC Level R36

R36 sets the bias on Q9 to determine correct fm modulator input when a standard video signal is applied to TP-1.

Video Amplifiers Q10, Q11

Amplification provided by amplifiers Q10 and Q11 correct for the attenuation resulting from the AGC stage. Degenerative feedback from the collector of Q11 to the emitter of Q10 maintains bandwidth. Output of Q11 is fed to the luminance AGC detector (Q12, D2, D3) and the mono/color switch (Q15, Q16, Q55, Q17).

Luminance AGC Q12, D2, D3

Amplifier Q12 drives the luminance AGC detector. This transistor employs local negative feedback in the emitter circuit provided by L3 and C26. This tank circuit reduces gain at 3.58 MHz to render the circuit insensitive to color burst in back porch of sync. Q12 also mixes luminance signal with a narrow negative pulse applied at the emitter. This pulse is delayed to occur during the back porch of sync. It appears in the collector as a negative pulse that is always slightly more negative than peak white as shown in Fig. 3-6. Since peak white is fixed by the reference pulse, the total

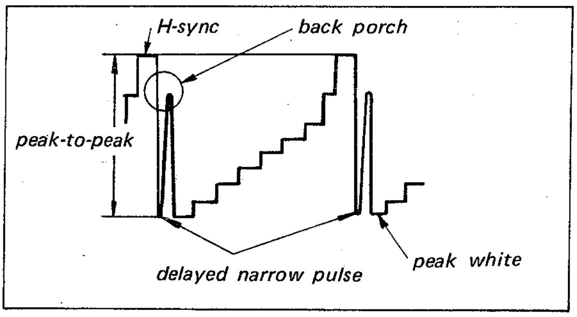


Fig. 3-6. Waveform at TP-4 (delayed pulse at back porch of sync)

peak-to-peak signal applied to the rectifier circuit is determined primarily by the amplitude of sync in the composite input. This renders AGC relatively insensitive to variations in picture content.

Diodes D2 and D3 function as a voltage doubler to provide a d-c control voltage proportional to sync amplitude. This positive-going voltage is applied to the gate of Q9. An increase in bias, resulting from a high input signal acts to reduce the source-to-drain resistance of Q9 to lower the output of the voltage divider.

Color/Mono Switch
Q13, Q14, Q15, Q17
Q16, Q55

Signal output of Q11 at TP-3 branches in two directions for color/mono selection. The route for mono luminance signal is via Q17. Luminance components of color input signals are applied to emitter follower Q13 (to drive the 3.58 MHz traps and the delay line DL-1). The traps remove chrominance signals and the delay line matches luminance time delay to the normal delay of the chrominance-processing circuits.

Color Mode
Luminance Level
R52

R52 adjusts the level of the filtered and delayed signal to match that of monochrome operation. The delay line terminates in the low input impedance of Q14 which is connected as a common-base amplifier. Output of Q14 is applied to the collector of color mode switch Q15. In the color mode of operation Q15 is saturated by bias applied at its base. This effectively shorts emitter to collector to transfer signal to Q16. If the signal to be recorded is monochrome, the absence of burst is detected (as will be explained later) and forward bias is then removed from Q15 and Q17 is turned on to transfer the wideband signal to Q55. Q16 and Q55 share a common emitter resistor so that output of either the mono or color switches is developed across R64.

Amplifier Buffer
Q18, Q19

Signal output of the Color/Mono switch is fed to amplifier Q18 through the pre-emphasis network C38 and R71. Bias for Q18 is controlled by the sync-tip AFC system.

Emitter follower Q19 provides a low impedance source of signal for Low-Pass Filter A. This filter limits the video passband to minimize spurious response caused by excessive sideband width.

White Peak Freq
R76

R76 adjusts the total peak-to-peak signal swing at TP-6. Since the sync tip is effectively clamped by the AFC system, the setting of R76 determines maximum upward deviation or the peak-white frequency. It is set for a frequency of 5.4 MHz at peak white.

Modulator Drive
Q20

Q20 applies video to the control input of the frequency modulator. A diode clipper (D4) in the collector circuit of Q20 conducts if the positive signal excursion (at peak white) exceeds the voltage set by R83.

White Clip
R83

This prevents positive excursions that could cause over deviation of the modulator. R83 is set to clip signals to limit the peak-white deviation value to 140% of normal value.

Frequency
Modulator
Q21, Q22

Q21 and Q22 form a voltage-controlled symmetrical astable multivibrator. It is set up to oscillate at 3.8 MHz under no-input-signal conditions.

Carrier Balance R89, R90

The circuit is balanced by R89 in the collector circuit and R90 in the base circuit. These resistors are set for waveform symmetry to facilitate attenuation of the carrier signal in the demodulation process. (The demodulator operates as a frequency doubler to place the carrier outside the video passband. If waveform symmetry is not sufficient, residual carrier (termed "carrier leak") appears inside the video passband. Diodes D6 and D7 limit base current to minimize saturation delays when the transistors switch from on to off.

Frequency control is achieved by supplying source of video to the bases. A positive-going signal (white excursion) raises the bias to bring the cut-off transistor into conduction sooner, thereby raising the frequency of operation.

Output of the multivibrator is transformer coupled by T1 to convert from push-pull to single-ended feed. Output of T1 is fed through C56 to the demodulator (A-R) board for E-to-E operation. The signal that goes this route is demodulated and processed for application to the video out jack and VHF modulator. This makes it possible to monitor the signal, after modulation and demodulation, while the recording is in progress. The remaining feed from T1 applies signal to a symmetrical limiter.

Limiter Q23, D8, D9

Amplifier Q23 drives the limiter which consists of two parallel and oppositely-poled silicon diodes, D8 and D9. These diodes conduct to limit signals that exceed about 0.6 volt in either direction.

Emitter follower Q24

Output of the limiter is buffered by emitter follower Q24, which serves as the feed point for the modulator AFC system and the video-head drivers.

Sync Tip AFC Q26, Q25, D10, D11

One branch of signal from Q24 is fed to amplifier Q26, which drives a low-pass filter. This filter places 3.8 MHz on the slope of the upper skirt of the filter. Thus the signal applied to Q25 is a function of frequency. If the modulator tends to drift higher in frequency, the output of the filter drops. A drop in modulator frequency has the opposite effect. Filter output is applied to a class C amplifier, Q25, which produces an output for frequencies within the range of the filter (predominately the sync tip frequency of 3.8 MHz). This output is rectified by voltage doubler D10 and D11 to provide a dc control voltage that is applied as feedback to the base of Q18. This dc bias, which is direct coupled to the modulator, acts to offset and change in sync-tip frequency. The remaining feed from Q24 supplies fm luminance signals via a second color/mono switch to the video-head drive circuits as follows:

Color/Mono Switch Q40, Q41, Q42

Signal is coupled through C91 to the collectors of Q40 and Q42. Q42 is turned on in the monochrome mode (if there is no burst in the input signal). In the color mode, Q42 is off and Q40 is on, routing the signal through a high pass filter to the collector of Q41. Hence the fm signal is band limited to prevent crosstalk with the color sidebands centered at 688 kHz. Output of Q41 or Q42 is taken across R176 and

Emitter Follower
Q44

Muting
Q43

fed to emitter follower Q44. Transistor Q43 is connected between the base of Q44 and ground to short out signal when a muting voltage is applied to the base of Q43. Muting voltage is supplied during tape threading by the servo board.

The emitter of Q44 serves as the feed point for the amplifiers (V board) that drive both video heads.

V Board

Record Current
Adjust
R184, R186

Potentiometers R184 and R186 permit adjustment of drive to A and B video heads respectively to permit optimum record current.

Record Amplifiers
Q45, Q46, Q47
Q51, Q52, Q53

Amplifiers Q45 and Q46 (Q51 and Q52) supply the necessary preamplification and Q47 (Q53) act as power amplifiers. Record- current frequency characteristics are set by R195 (R223) and R197 (R226). Output of the power amplifiers is coupled through T3 and T4 to the REC/PB relays on the B-R board prior to application to the A and B video heads.

Color Processing

To follow the path for chrominance-signal processing, refer back to the composite input signal feed point at TP-1. Composite signals are routed first through a high-pass filter C67, R114 and C68 to remove luminance components below 3 MHz.

Chrominance
Amplifier/AGC
Q27, Q28

Q27 provides amplification of the separated 3.58 MHz chrominance signals and also provides AGC. Gain control is achieved by Q28 which acts as a variable resistance in the emitter circuit of Q27. Signal output of Q27 is routed through a bandpass filter that rejects signals outside the chrominance passband (3.58 MHz ± 500 kHz).

Emitter Follower
Q29

Buffer Q29 terminates the bandpass filter in a high impedance to secure the required skirt response and provide a buffered feed point for the burst gate/balanced modulator that follow.

Balanced Modulator
Q35, Q36, Q37

Signal from Q29 is fed through C81 to the base of Q36. This transistor provides single-ended input to the balanced modulator.

A CW input from the 4.27 MHz oscillator is applied to the base of Q37 and the base of Q35 which is at r-f ground. In this arrangement the push-pull components from Q36 are cancelled at the center tapped output transformer but the 4.27 MHz signal and the modulator products do not. The lowpass filter consisting of L11, L12, and C85 through C87 select the difference modulator components at 688 kHz. Thus, the 688 kHz output signal is produced without a carrier in the same way that the carrier is suppressed in the composite signal.

Color REC Level
R162

Color E-to-E Level
R161

Potentiometers at the output of the low-pass filter set up the level of 688 kHz chrominance signals applied to the video heads (R162) and the level of signal fed to the A-R board for E-to-E operation (R161).

688 kHz Amplifiers
Q38, Q39

Output of the Color REC Level control R162 is amplified by Q38 and buffered by emitter follower Q39 to drive the power amplifier Q54. Q38 is driven into saturation during mono recordings by a bias applied through R163 from the color/mono switch (Q17).

Color Rec Amplifier
Q54 (V board)

The output of this transistor is coupled to A and B video heads through C108/R202 and C129/R231 respectively. Chrominance signals are applied in shunt with the luminance signals to the video heads.

Buffer Amplifier Q50

The signal feed from R161 is buffered by emitter follower Q50 to drive the demodulator circuits on the A-R board for E-to-E display.

4.27 MHz Oscillator Q48 and Q49

CW signal to drive the balanced modulator is produced by the Colpitts-crystal oscillator Q48. Feedback is developed by the voltage divider C112 and C113 and applied to the emitter resistor R207. Transistor Q49 is normally conducting in the color-record mode. It is cut off if the input signal is not in color to disable the oscillator during monochrome recordings.

ACC and Color/ Mono Switching

Burst is separated from the input chrominance signal (at 3.58 MHz) to drive the color ACC system and the color-mono electronic switch. Chrominance output of Q29 at TP-11 is coupled to the base of the burst gate Q30 via C73 and R130. The base of the PNP transistor is also driven with a negative pulse timed to coincide with burst which is derived from the sync separator stages. Q30 is normally cut off by signal bias developed in the emitter circuit and comes into conduction only during the burst intervals. Thus the collector circuit contains separated burst. The tuned load for Q30 (C75 and L10) develops the burst signal and applies it to the detector D12 and D13.

ACC Level R135

The ACC level control R135 determines the level at which D12 will conduct on positive signal swings and so determines the charge on C76. During negative signal swings C76 dumps its charge and the peak negative signal charges C79 via D13. Hence the voltage applied to the gate of the ACC amplifier Q31 swings less positive with an increase in burst level. Output at the source of Q31 is applied back to the base of Q28 for ACC control. Another feed from Q31 drives the color killer detector Q32.

ACC Amplifier Q31

Color Killer Q32

Color Killer Threshold R143

This transistor has an adjustable bias applied to its emitter via R143 to establish the threshold bias. Q32 will turn off when detected burst level drops below the emitter bias level.

Color/Mono Switch Q33, Q34

Q32 is on in the absence of burst in the input signal. This turns Q33 on and turns Q34 off. (Note that these are PNP transistors.) The positive voltage developed at the collector of Q33 is applied to the mono section of electronic switches at Q17 and Q42. In addition, Q38 saturates to shut down the color-record current circuits. In the color mode, Q32 cuts off to turn off Q33 and turn on Q34. The positive voltage then developed across R148 is applied to the color sides of the electronic switches at Q15 and Q40. In addition the 4.27 MHz oscillator is turned on by the application of forward bias to Q49.

Sync Separation

Input video is processed to separate sync to provide:

1. vertical sync for the servo reference.
2. a delayed burst gate for the ACC and color/mono switching system.
3. reference pulses for the luminance AGC system.

Sync Separator Drivers Q3, Q4	Input video at TP-1 is amplified and inverted by Q3 and applied through emitter follower Q4 to the base of sync separator Q5. Positive going pulses at the base of Q5 drive this transistor into conduction to provide separated negative-going sync at the collector. Horizontal sync pulses at the collector of Q5 shock the low-Q tank circuit of L2 and C8 into oscillation for about 1½ cycles. The negative-going first half cycle is developed across C8 and is applied to the burst gate (Q30) as the gating pulse. A second output of Q5 feeds through a two stage integrator C9, C10 and R19, R20 to develop negative-going vertical sync at the base of Q6.
Sync Amplifiers Q6, Q7	Amplifiers Q6 and Q7 amplify separated vertical sync for use as the servo reference. A 23V (p-p) negative pulse is developed at TP-2. Part of this pulse, developed across R25, is fed to the servo board to lock the servo in the record mode.
AGC Reference Pulse Amplifier Q8	A third feed from the sync separator Q5 is fed to Q8 through the 39 pF capacitor C14. This capacitor differentiates horizontal sync pulses to provide a positive-going pulse at the trailing edge of sync. Q8 conducts for a very short interval following the trailing edge of sync to provide a negative reference pulse during the back porch interval. This pulse is fed to the luminance AGC system to provide a reference-white signal as explained earlier.

3-5. SYSTEM CONTROL

Mechanical functions connected with tape threading and unthreading, the initiation and regulation of PLAY, STOP, REWIND, and FAST FORWARD modes as well as automatic stop action at the end of the tape are performed by the System Control circuitry.

There are nine distinct modes of operation performed by System Control. The system becomes operable after the power switch has been depressed and a VIDEOCASSETTE has been inserted into the holder. The operation modes are:

3-4-1 PLAY
3-4-2 Manual STOP, during PLAY mode
3-4-3 AUTO REWIND (1) at tape run-out during PLAY
3-4-4 REWIND
3-4-5 Manual STOP, during REWIND
3-4-6 AUTO REWIND (2) at tape run-out during PLAY or FAST FORWARD
3-4-7 FAST FORWARD
3-4-8 Manual STOP, during FAST FORWARD
3-4-9 AUTO STOP at tape run-out during FAST FORWARD

To aid in understanding and troubleshooting the system, separate functional diagrams will be shown for each function. A brief summary of all mechanical and electrical actions will precede the functional diagrams. Refer to the functional diagram and the complete block diagram on pages 11-4 ~ 11-9.

System Control is disabled until power is applied and a VIDEOCASSETTE has been inserted. The latter is accomplished by S6009, the microswitch that is actuated when the loaded VIDEOCASSETTE holder falls into the operating position. Switch S6009 applies +13 volts to the System Control board.

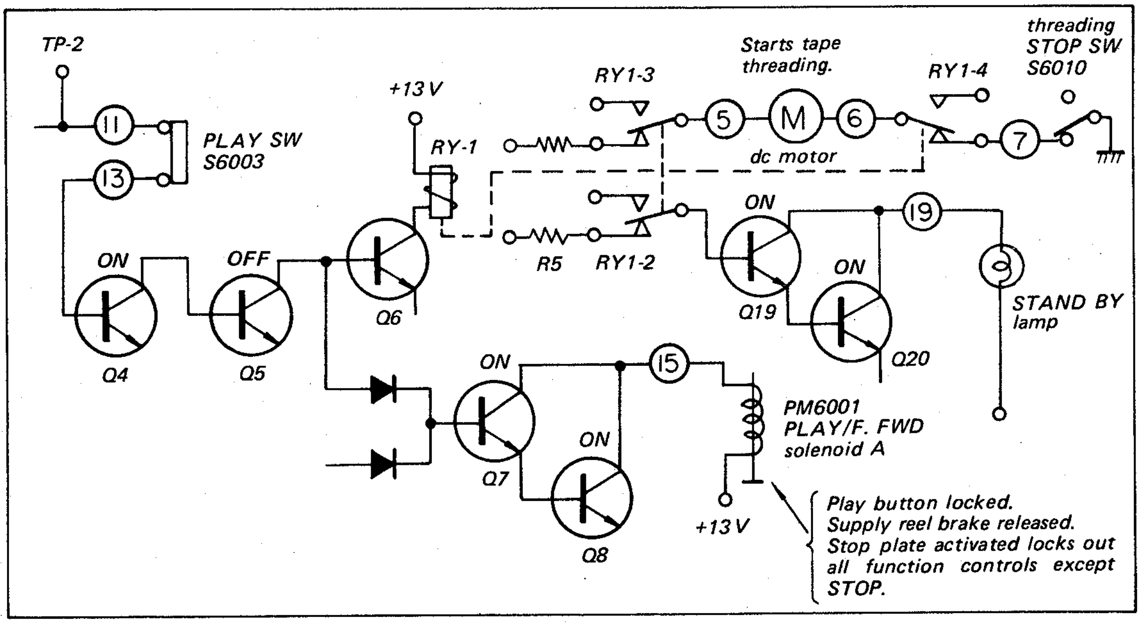
3-5-1. Play Mode

The PLAY mode sets up tape threading, starts the head drum/capstan motor, locks out all operating buttons except STOP, puts the pinch roller in place, starts tape motion and activates the back tension regulator.

The VIDEOCASSETTE is also locked in place. The three distinct sequences to put the machine into the play mode are shown in Figs. 3-7 through 3-9.

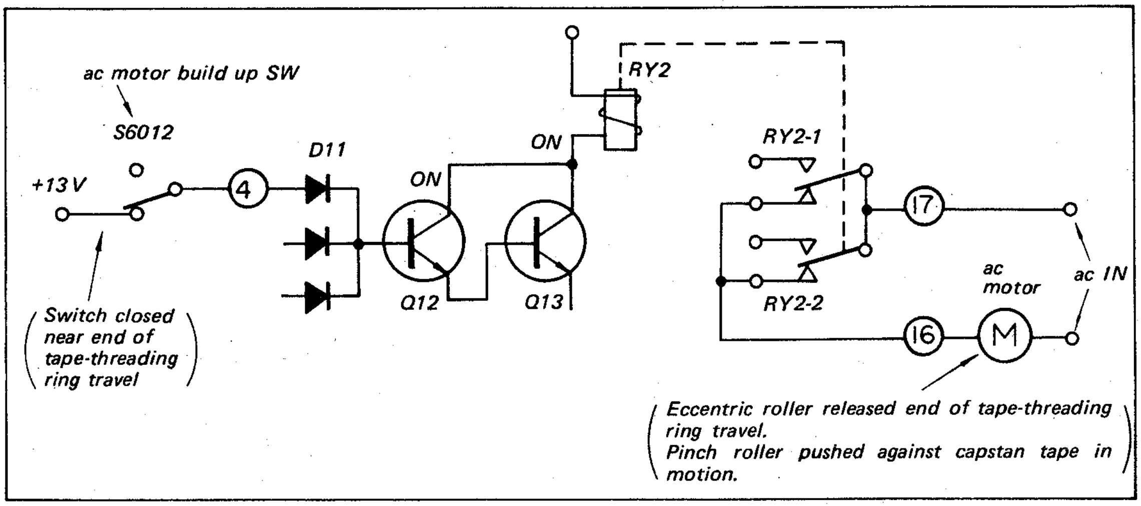
Sub-Function 1 – STOP INTERLOCK

During the final phase of tape threading, the STOP button must be disabled. Initiating STOP at this time would cause the mechanism to jam in the threaded condition. See Fig. 3-10 (a).


TP-2
11
13
PLAY SW
S6003
+13 V
RY-1
RY1-3
Starts tape threading.
5
M
6
dc motor
RY1-4
threading STOP SW
S6010
7
R5
RY1-2
ON
19
ON
OFF
Q6
Q19
ON
STAND BY lamp
Q4
Q5
Q20
ON
15
PM6001
PLAY/F. FWD
solenoid A
Q7
ON
Q8
+13 V

Play button locked.
Supply reel brake released.
Stop plate activated locks out all function controls except STOP.

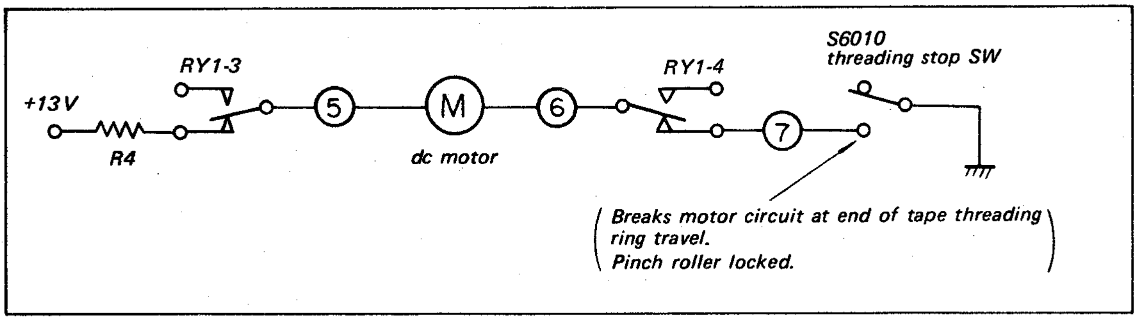
Fig. 3-7. Start tape threading


ac motor build up SW
S6012
+13 V
4
D11
ON
ON
RY2
RY2-1
17
Q12
Q13
RY2-2
ac motor
ac IN
16
M

Switch closed near end of tape-threading ring travel

Eccentric roller released end of tape-threading ring travel.
Pinch roller pushed against capstan tape in motion.

Fig. 3-8. Head-drum/capstan (ac) motor starts


+13 V
RY1-3
R4
5
M
dc motor
6
RY1-4
7
S6010
threading stop SW

Breaks motor circuit at end of tape threading ring travel.
Pinch roller locked.

Fig. 3-9. Finish tape threading (1) (Stop function lockout)

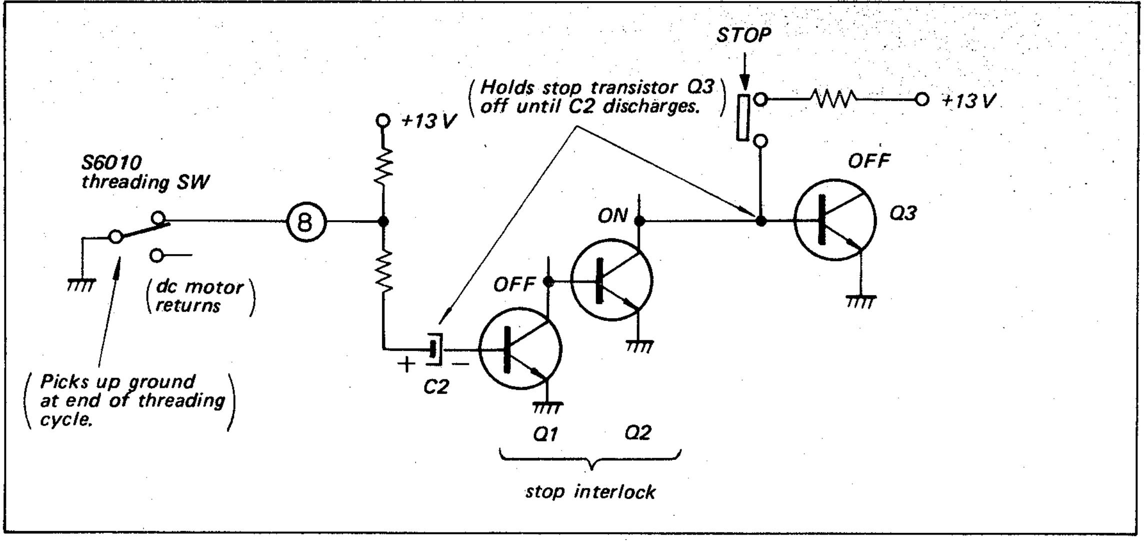

STOP
Holds stop transistor Q3 off until C2 discharges.
+13 V
+13 V
S6010 threading SW
8
OFF
ON
OFF
Q3
dc motor returns
Picks up ground at end of threading cycle.
+
−
C2
Q1
Q2
stop interlock

Fig. 3-10 (a). Finish tape threading (2)

Play Lockout

The circuit shown in Fig. 3-10 (b) prevents PLAY from being initiated during the unthread cycle. This prevents reversal of the threading ring in mid cycle and formation of a slack-tape loop. While the threading ring is in mid cycle, both S6010 and S6011 are open as shown. Q4 is normally off. This keeps Q3 (Stop) saturated until unthreading is completed. In early units diodes D23-D25 are mounted on a separate small Y board.

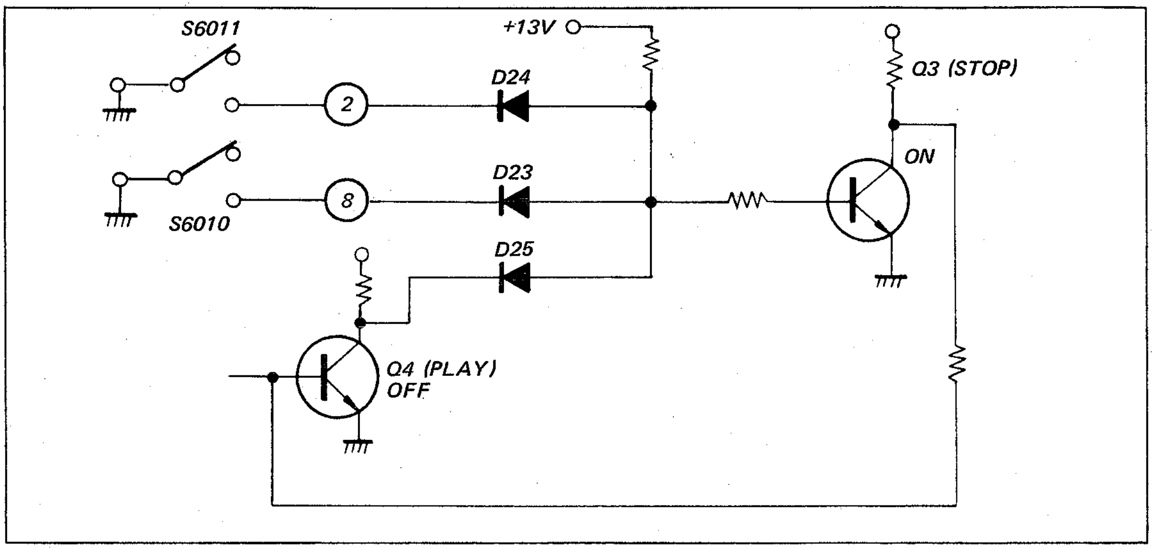

S6011
+13V
2
D24
Q3 (STOP)
ON
8
D23
S6010
D25
Q4 (PLAY)
OFF

Fig. 3-10 (b). PLAY lockout during unthread

3-5-2. Manual STOP, During Play Mode

Conditions during PLAY mode, prior to pressing STOP button are as follows.

1. RY1 energized; see PLAY 1 (Fig. 3-7)
2. RY3 energized; see below

The sequence of events that follow the action of the STOP button are shown in Figs. 3-11 to 3-15.

At the end of the unthreading cycle following manual STOP a short rewind interval, called Auto-rewind 1 is initiated. Tape rewinds for about one second. This repositions the tape to compensate for the threading loop and ensure restarting at the point where the tape was stopped.

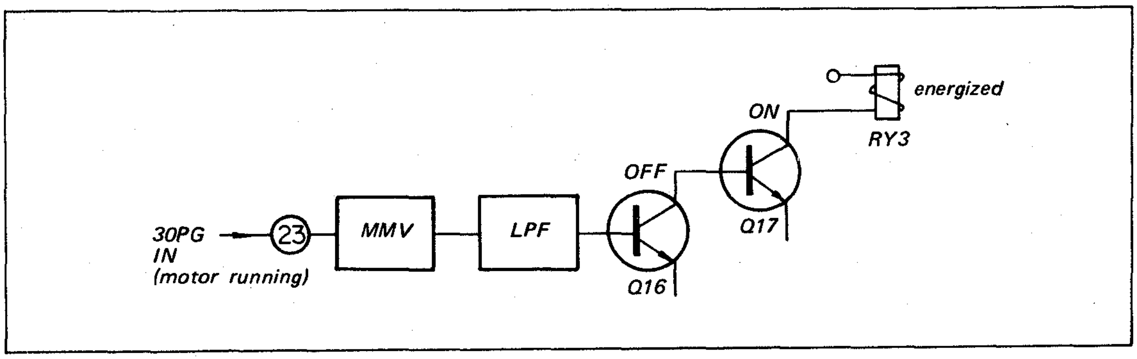

energized
ON
RY3
OFF
Q17
30PG IN (motor running)
23
MMV
LPF
Q16

Fig. 3-11. RY3 energizing system

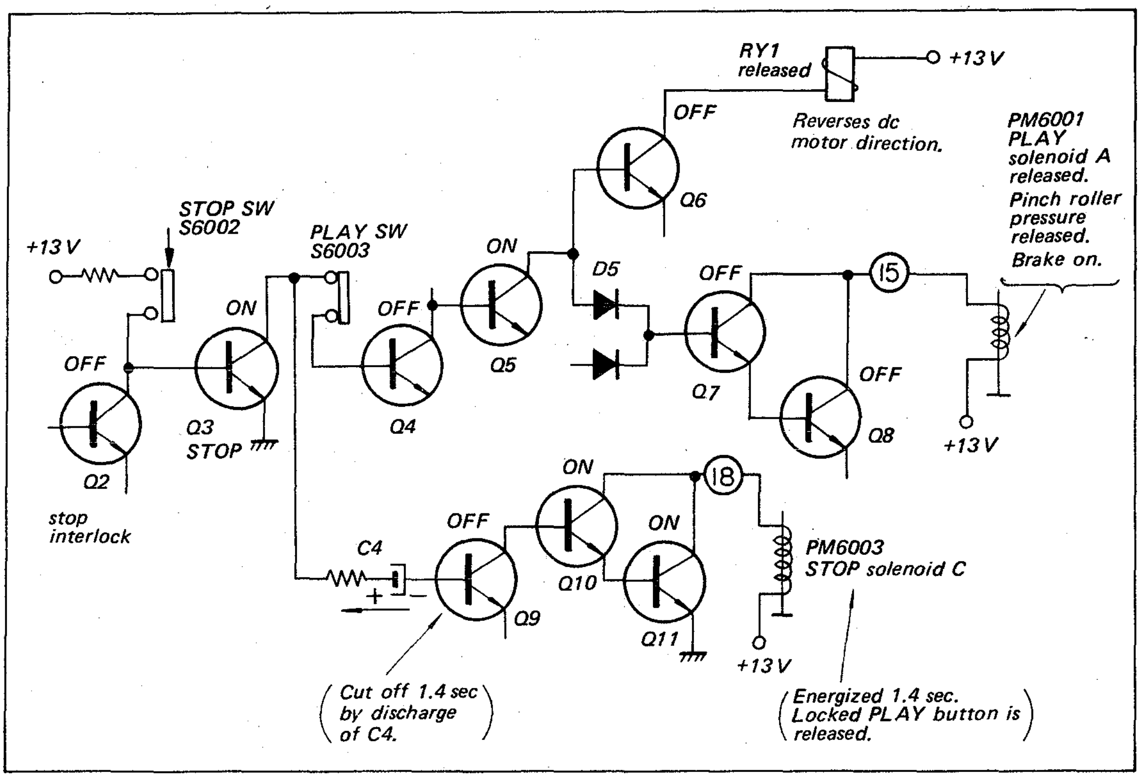

RY1 released
+13 V
OFF
Reverses dc motor direction.
PM6001 PLAY solenoid A released. Pinch roller pressure released. Brake on.
Q6
STOP SW S6002
+13 V
PLAY SW S6003
ON
D5
OFF
15
ON
OFF
OFF
Q5
Q7
OFF
Q3 STOP
Q4
OFF
Q8
+13 V
Q2
ON
18
stop interlock
OFF
ON
C4
PM6003 STOP solenoid C
Q10
Q9
Q11
+13 V
Cut off 1.4 sec by discharge of C4.
Energized 1.4 sec. Locked PLAY button is released.

Fig. 3-12. Manual stop action during play mode

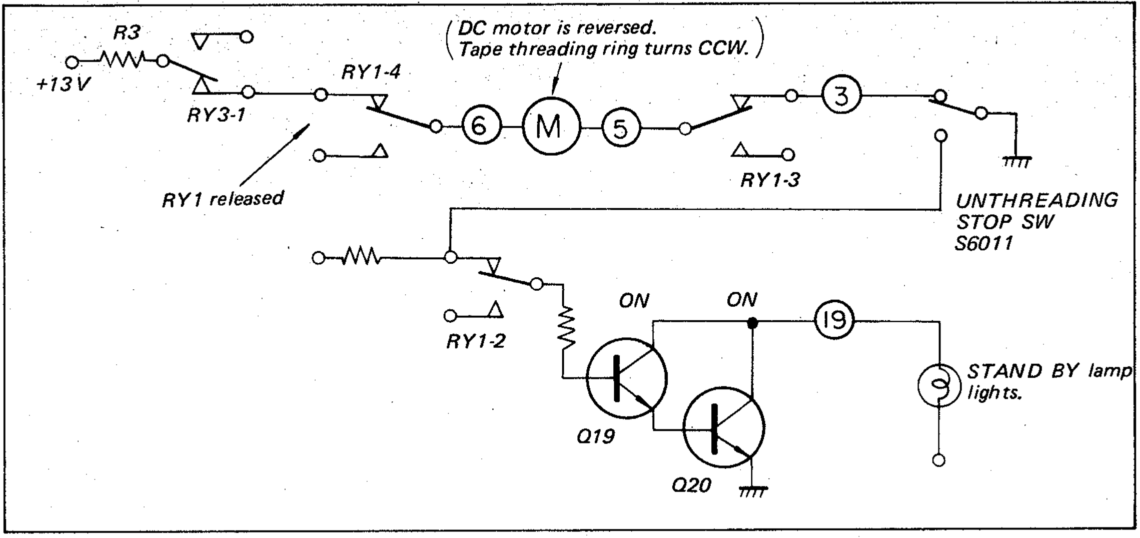

R3
+13 V
RY3-1
RY1-4
RY1 released
DC motor is reversed.
Tape threading ring turns CCW.
6
M
5
3
RY1-3
UNTHREADING
STOP SW
S6011
RY1-2
ON
ON
19
STAND BY lamp lights.
Q19
Q20

Fig. 3-13. Tape unthreading starts

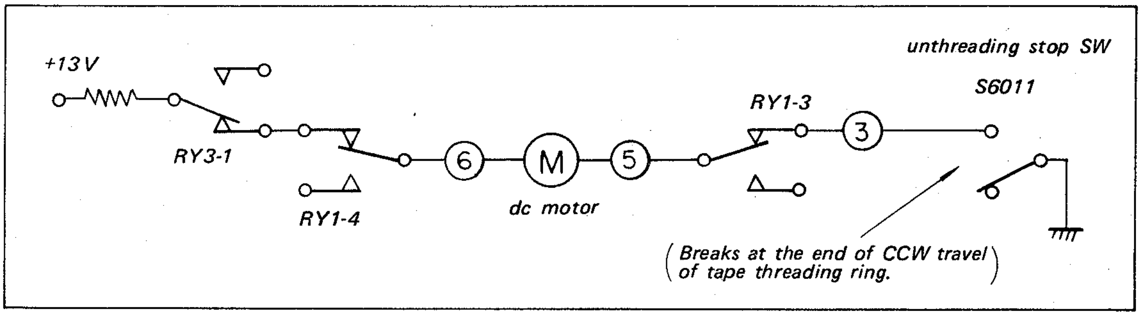

+13 V
RY3-1
RY1-4
6
M
5
dc motor
RY1-3
3
unthreading stop SW
S6011
Breaks at the end of CCW travel of tape threading ring.

Fig. 3-14. Tape unthreading finished

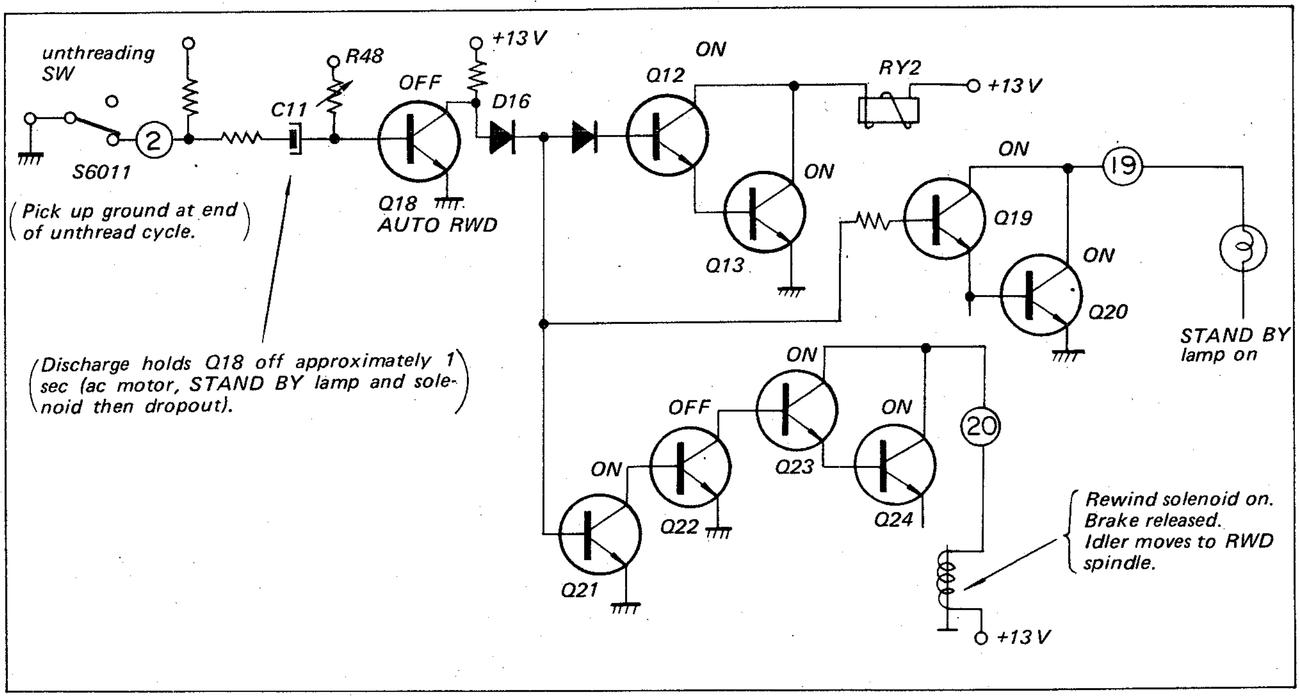

unthreading SW
S6011
2
Pick up ground at end of unthread cycle.
C11
R48
+13 V
OFF
D16
Q18
AUTO RWD
Discharge holds Q18 off approximately 1 sec (ac motor, STAND BY lamp and solenoid then dropout).
ON
Q12
RY2
+13 V
ON
Q13
ON
19
Q19
ON
Q20
STAND BY lamp on
ON
OFF
ON
Q23
ON
Q24
20
Q22
Q21
Rewind solenoid on.
Brake released.
Idler moves to RWD spindle.
+13 V

Fig. 3-15. Auto rewind action

3-5-3. Auto Stop At Tape Run-Out During Play

End of tape is sensed by phototransistor illumination through clear leader. Stop is initiated, tape is unthreaded, and Auto Rewind 1 is accomplished. See Fig. 3-16.

Note: Q3 (stop transistor) is switched on from two parallel sources at the end of the tape in PLAY. These sources are Q31 (TP-8) and Q32 (TP-9). Thus the initiation of STOP is redundant in the PLAY mode. The system will work normally if either TP-8 or TP-9 is grounded.

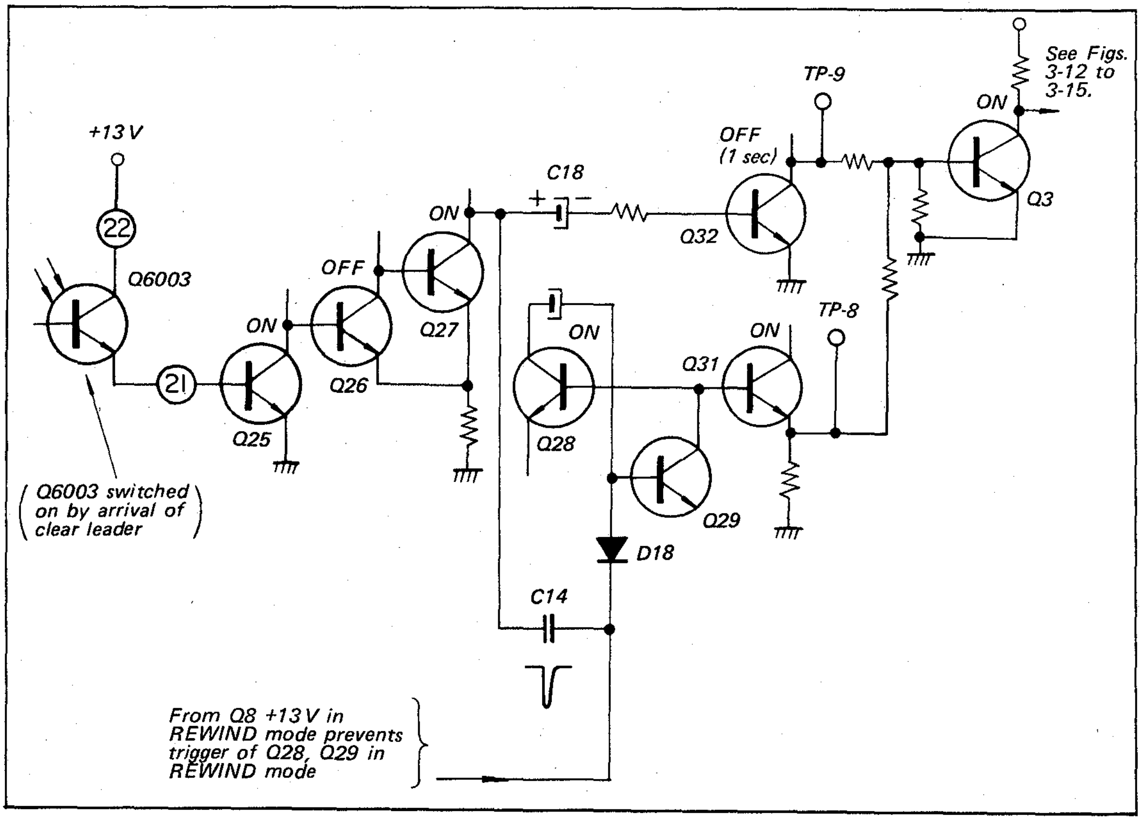

+13 V
22
Q6003
21
Q25
ON
OFF
Q26
ON
Q27
C18
+
−
Q32
OFF
(1 sec)
TP-9
ON
Q3
See Figs. 3-12 to 3-15.
ON
Q28
Q31
ON
TP-8
Q29
D18
C14
Q6003 switched on by arrival of clear leader
From Q8 +13 V in REWIND mode prevents trigger of Q28, Q29 in REWIND mode

Fig. 3-16. Auto stop action during PLAY mode

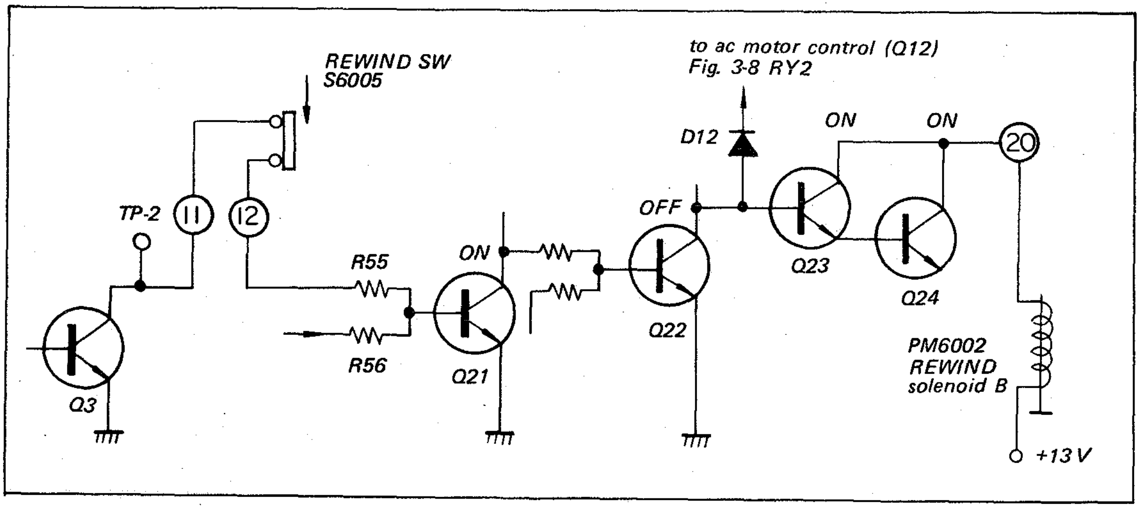

REWIND SW S6005
TP-2
11
12
Q3
R55
R56
ON
Q21
OFF
Q22
to ac motor control (Q12) Fig. 3-8 RY2
D12
ON
ON
20
Q23
Q24
PM6002 REWIND solenoid B
+13 V

Fig. 3-17. Rewind action

3-5-4. Rewind

Rewind Solenoid B is energized. Main (ac) motor energized. REWIND button is latched. Take-up reel spindle is released. VIDEOCASSETTE is locked in place. Rewind solenoid is energized and supply reel spindle is driven in reverse. See Fig. 3-17.

3-5-5. Manual Stop During Rewind

Rewind Solenoid B is released. Stop Solenoid C is energized momentarily to unlatch the REWIND button. Main (ac) drive motor is switched off. See Fig. 3-18.

3-5-6. Auto Stop At Tape Run-Out During Rewind

End of tape is sensed by clear leader at beginning of tape. Auto Stop signal is generated. Rewind Solenoid B is released. Stop Solenoid C is energized momentarily to release REWIND push button. The Main (ac) Drive motor shuts down. Refer to Fig. 3-19.

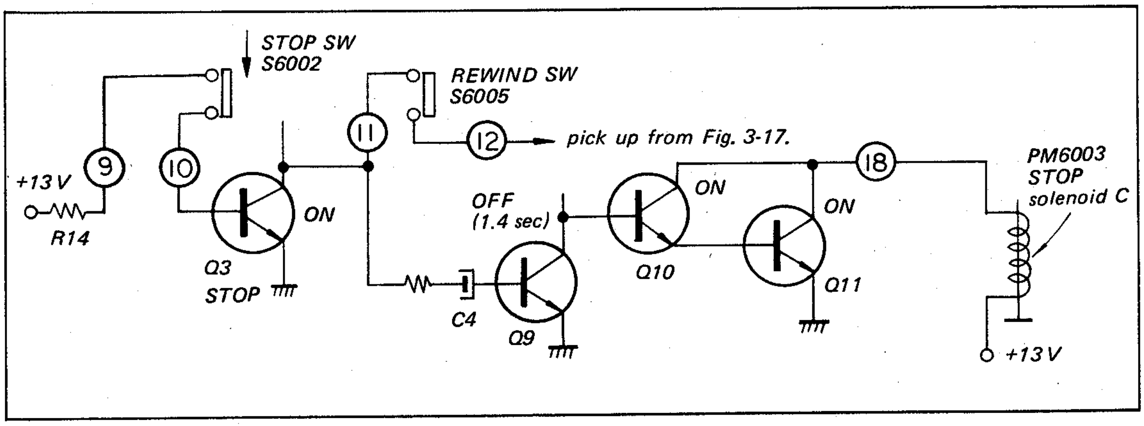

STOP SW
S6002
REWIND SW
S6005
pick up from Fig. 3-17.
+13 V
9
10
11
12
18
R14
ON
Q3
STOP
OFF
(1.4 sec)
C4
Q9
ON
Q10
ON
Q11
PM6003
STOP
solenoid C
+13 V

Fig. 3-18. Manual stop action during REWIND mode

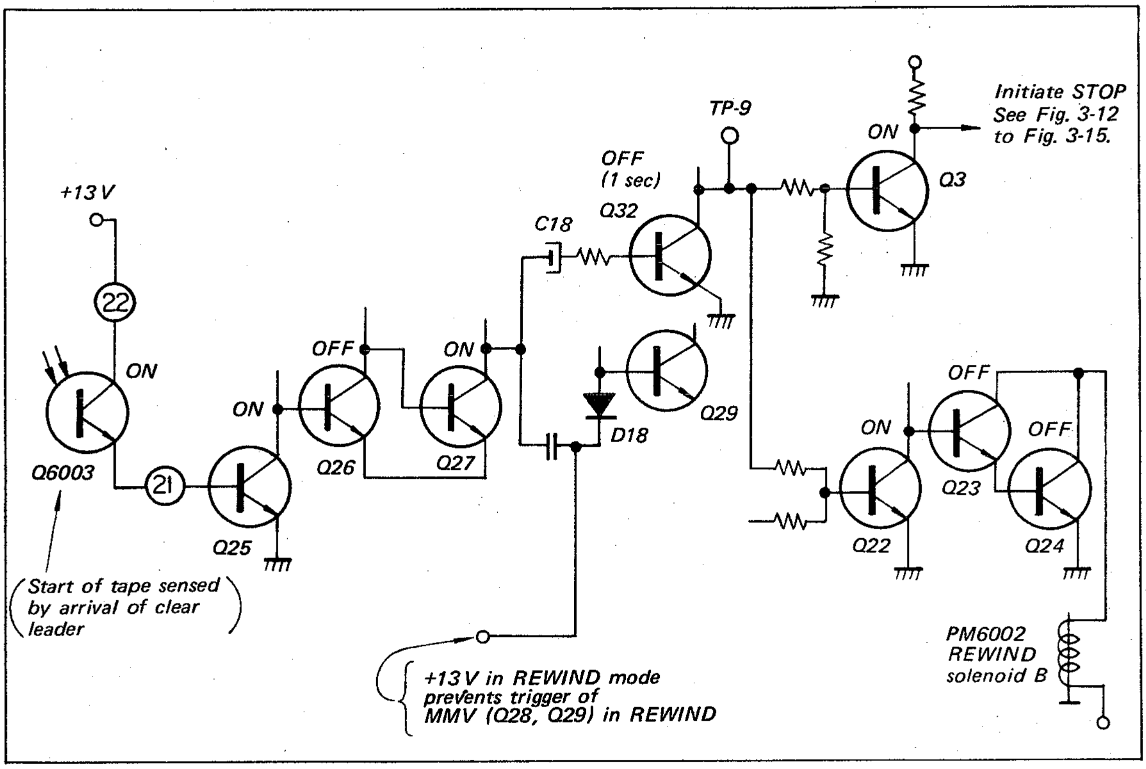

+13 V
22
ON
Q6003
21
Start of tape sensed by arrival of clear leader
ON
Q25
OFF
Q26
ON
Q27
C18
OFF
(1 sec)
Q32
D18
Q29
TP-9
ON
Q3
Initiate STOP
See Fig. 3-12
to Fig. 3-15.
+13 V in REWIND mode
prevents trigger of
MMV (Q28, Q29) in REWIND
ON
Q22
OFF
Q23
OFF
Q24
PM6002
REWIND
solenoid B

Fig. 3-19. Auto stop action during REWIND mode

3-5-7. Fast Forward

Play/Fast-Forward Solenoid A is energized to release Supply Reel brake. Drive idler is pressed against top drive surface of Take-Up Spindle Assembly to advance tape quickly. (Tape is not withdrawn from VIDEOCASSETTE). Fast Forward button is latched. VIDEOCASSETTE is locked in place. Stop plate is activated to prevent all buttons but STOP from being pushed. Main drive motor (ac) is switched on. Refer to Fig. 3-20.

3-5-8. Manual Stop During Fast Forward

Play/Fast-Forward Solenoid A is released. Stop Solenoid C is energized to unlatch F FWD button. Idler pressure is released (mechanical action only.) Main Drive Motor (ac) is switched off. See Fig. 3-21.

3-5-9. Auto Stop At Tape Run-Out During Fast Forward

Tape run-out is sensed by illumination of the phototransistor through the clear leader. This switches off the Play/Fast-Forward Solenoid A and activates the Stop Solenoid C momentarily. Rewind Solenoid B is then energized for 3 to 4 seconds to set up the AUTO REWIND 2 mode. At the completion of this interval the Rewind Solenoid B is released and the Main Drive Motor is de-energized. See Fig. 3-22 (b), (c), (d), (e).

After 4–5 seconds, MMV Q28 & Q29 returns to its stable state (Q28 off, Q29 on). At this time all transistors shown in Fig. 3-22 (a) reverse their states of conduction bringing Auto Rewind 2 to a stop.

Sub Function 2 – MMV and RY3 Protection Circuit

To prevent triggering of the ac Motor build-up relay RY3 and the AUTO STOP/RWD2 mode by the switching transient when power is first applied, the circuit shown in Fig. 3-23 is used.

Q30 on for approximately one second after power is first applied. This holds Q17 (and RY3) off and Q28 (MMV) off for the same period of time.

Sub Function 3 – Automatic Threading Ring Return

System control has been set up to return the loading ring to the starting position should it leave the starting position due to vibration during shipment. Power supply voltage (+13V) is applied to the D board so that the machine will complete tape unthreading (See Fig. 3-14) to return the threading ring to the starting position. All that is necessary to reset the machine is to depress the power switch.

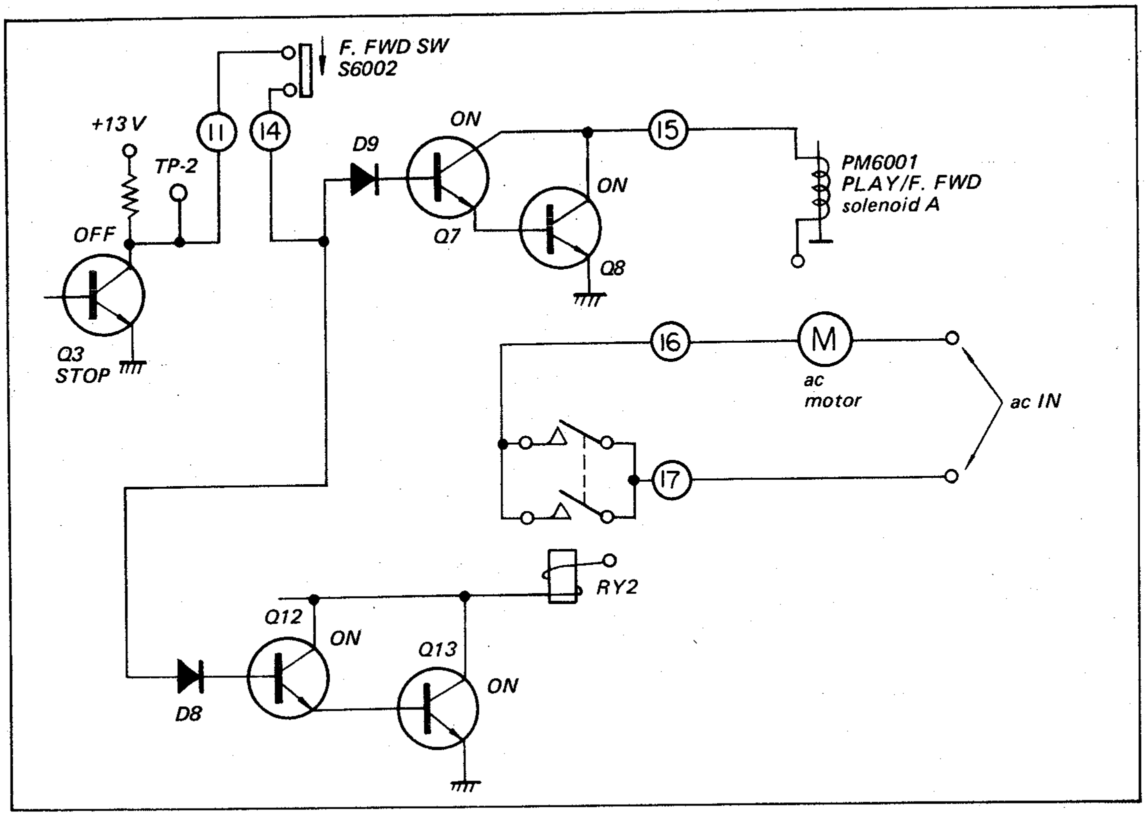


Fig. 3-20. Fast forward action

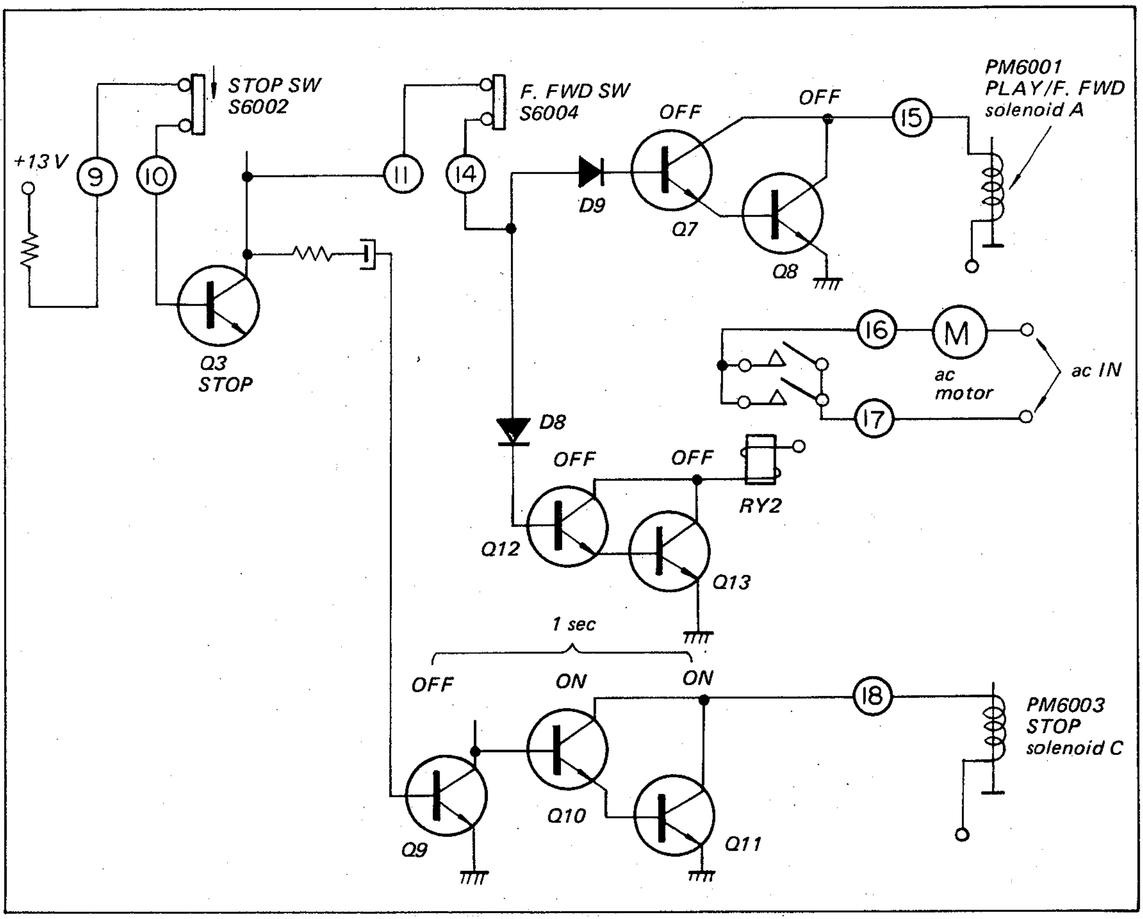
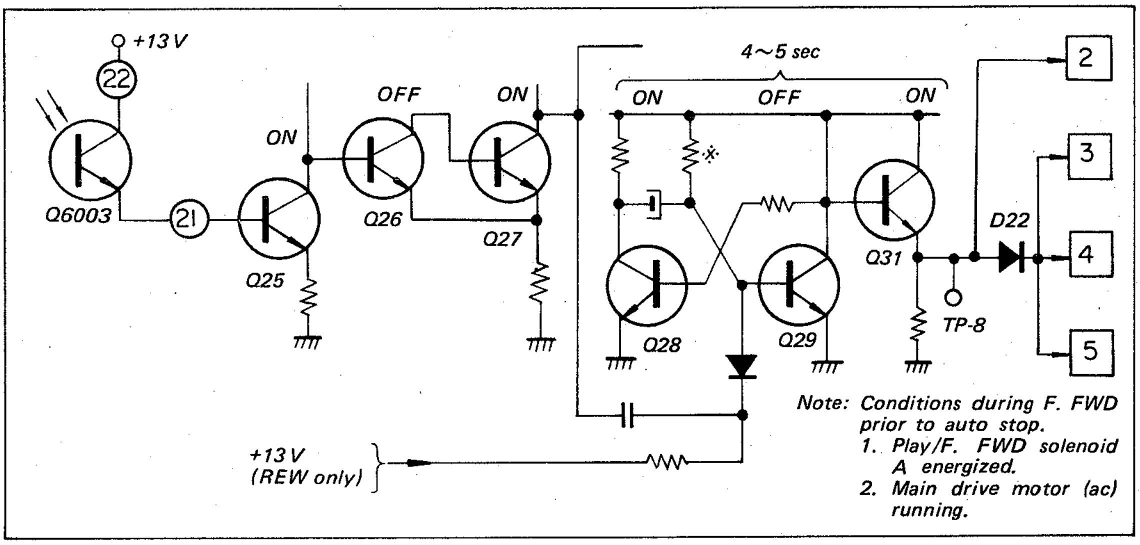

STOP SW
S6002
F. FWD SW
S6004
+13 V
9
10
11
14
15
PM6001
PLAY/F. FWD
solenoid A
OFF
OFF
D9
Q7
Q8
Q3
STOP
16
17
M
ac motor
ac IN
D8
OFF
OFF
RY2
Q12
Q13
1 sec
OFF
ON
ON
18
PM6003
STOP
solenoid C
Q9
Q10
Q11

Fig. 3-21. Manual stop during F. FWD mode


+13 V
22
Q6003
21
Q25
ON
OFF
ON
Q26
Q27
4~5 sec
ON
OFF
ON
※
Q28
Q29
Q31
D22
TP-8
2
3
4
5
+13 V
(REW only)

Note: Conditions during F. FWD prior to auto stop.
1. Play/F. FWD solenoid A energized.
2. Main drive motor (ac) running.

Fig. 3-22 (a). Initiation of auto stop

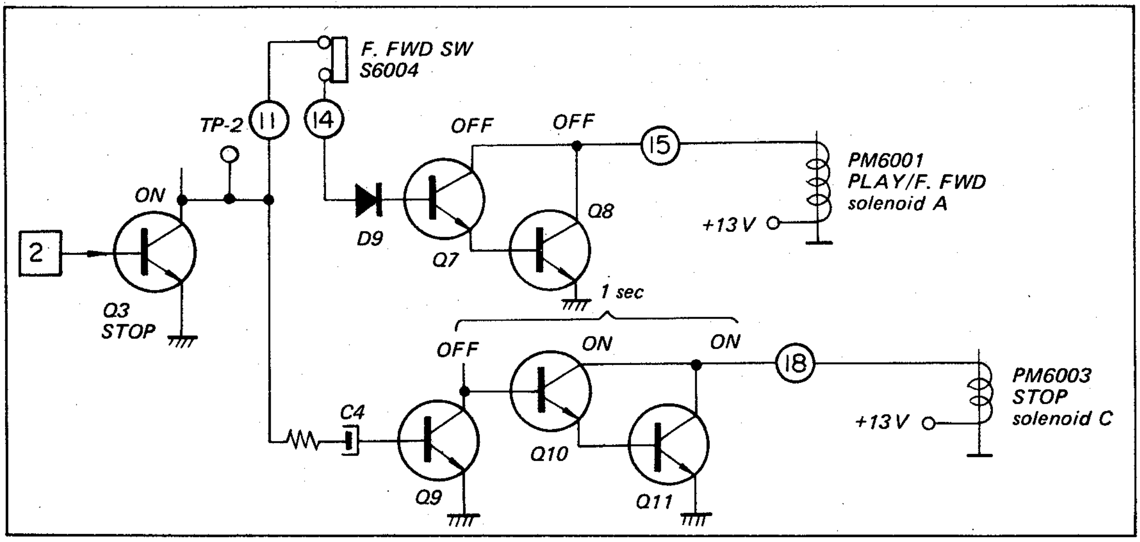

F. FWD SW
S6004
TP-2
11
14
OFF
OFF
15
PM6001
PLAY/F. FWD
solenoid A
ON
Q8
+13 V
2
D9
Q7
Q3
STOP
1 sec
OFF
ON
ON
18
PM6003
STOP
solenoid C
C4
+13 V
Q10
Q9
Q11

Fig. 3-22 (b). PLAY/F. FWD solenoid releasing

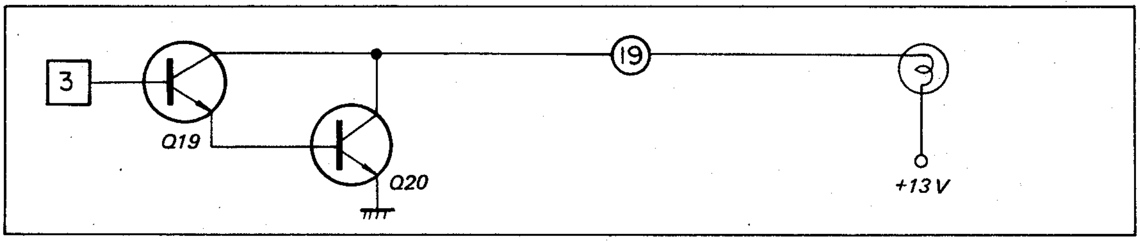

3
19
Q19
Q20
+13 V

Fig. 3-22 (c). STAND BY lamp on

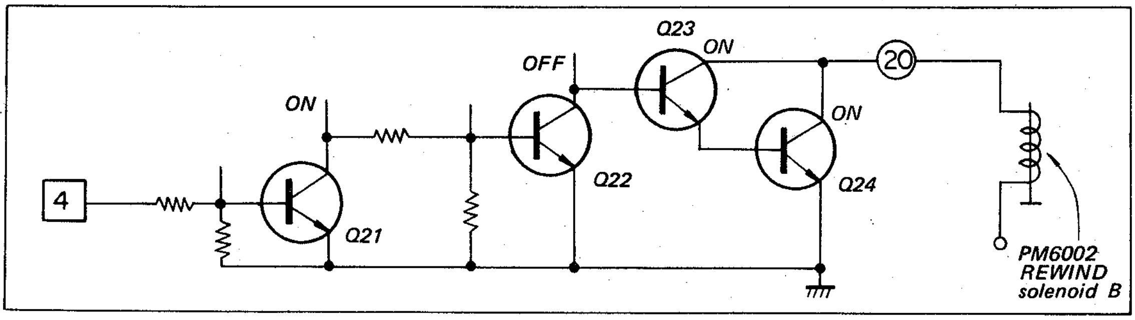

Q23
ON
OFF
20
ON
ON
4
Q22
Q24
Q21
PM6002
REWIND
solenoid B

Fig. 3-22 (d). REWIND solenoid on

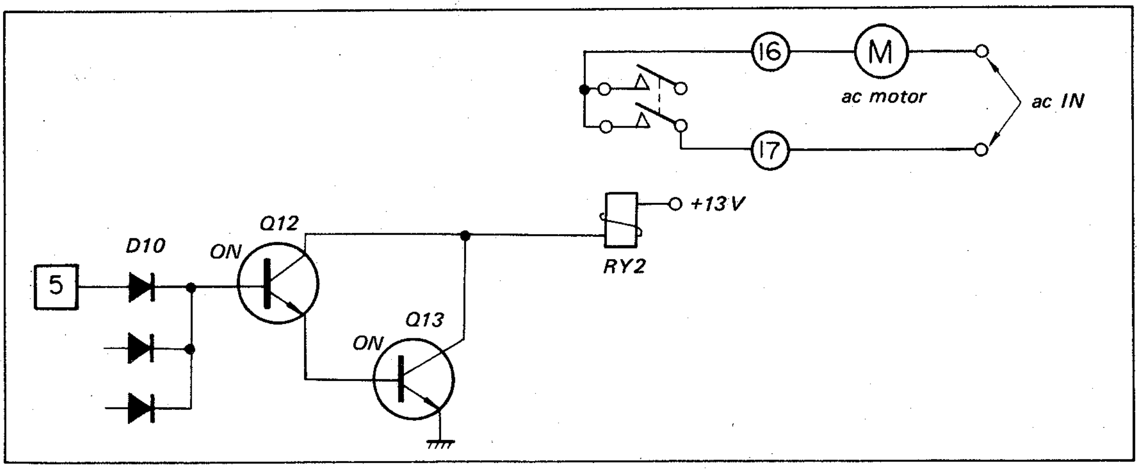
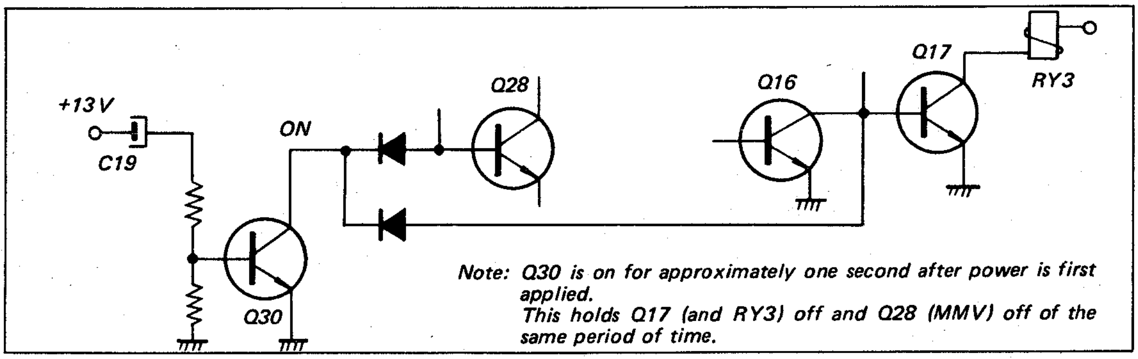

16
M
ac motor
ac IN
17
+13 V
Q12
D10
ON
RY2
5
Q13
ON

Fig. 3-22 (e). Main drive (a-c) motor on



Note: Q30 is on for approximately one second after power is first applied.
This holds Q17 (and RY3) off and Q28 (MMV) off of the same period of time.

Fig. 3-23. Defeat circuit at power switch ON

3-5-10. Auto-Stop Lamp Burnout Interlock

Production units employing the D-1 Board (after serial number 11,101) include a circuit to shut down the system should the lamp that illuminates the photo burn out or become disconnected.

The ac signal developed by lamp current across a 1-ohm series resistor R90 is amplified by Q33 and applied to a voltage doubler consisting of D26 and D27. See Fig. 3-24. The resulting dc output of this rectifier holds Q34 conducting in the normal state. If the lamp burns out the signal applied to the rectifier disappears, Q34 cuts off, and a positive signal is applied to Q3 to initiate STOP.

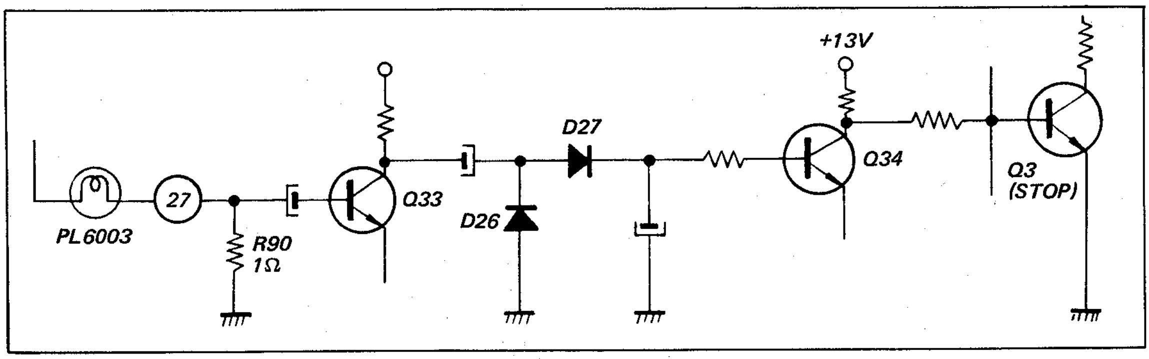


Fig. 3-24. Auto stop lamp interlock

3-5-11. Tape Slack Take-up

Units using the D-1 Board employ the sub circuit shown in Fig. 3-25. The action of this circuit is to activate the ac motor for a short interval when the cassette is dropped into operating position. This applies drive to the Take-Up reel to remove any slack in the cassette. When the Cassette-In switch S6009 is closed, C23 charges through R89. The voltage developed across R89 is coupled through D25 to turn on Q12 and Q13. Relay 2 is thus energized to activate the ac motor for a fraction of a second.

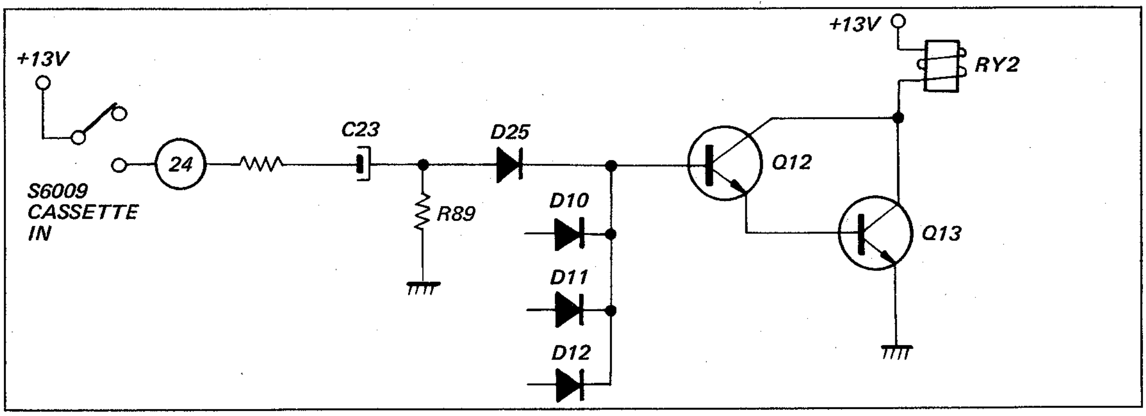


Fig. 3-25. Auto tape-slack removal

3-6. AUDIO CIRCUITS (C-R and H board)

The VO-1600 contains two identical audio record and playback systems to accommodate stereo or bilingual audio. In playback, both channels are operational and supply outputs at the L and R jacks on the rear panel. In addition either left, right, or mixed (L + R) outputs are selected by the VHF AUDIO SELECTOR to be fed to the VHF modulator.

In the record mode, both audio systems are operational when the INPUT SIGNAL SELECTOR is set to EXTERNAL. Since broadcast television is monaural, only one audio channel, Channel 2 (R), is used when the INPUT SIGNAL SELECTOR is set to TV. In the audio dub mode, CH 1 (L), is used exclusively.

Record circuits are mounted on the H board in the record pack along with the bias oscillator mounted on the E board. Playback circuits are mounted on the C-R Board at the rear of the main chassis. In the VO-1600 this board also houses the relays that switch the audio heads between the playback and record circuits.

Since the two audio systems are identical in most sections, the description that follows deal with the left channel except for pertinent differences. Playback circuits are described first.

3-6-1. C-R board

RY1, RY2	Playback signals from the audio-head RPH6001 feed through the normally closed contacts of RY1 (RY2) to the base of Q1.
Amplifiers Q1, Q2	Transistors Q1 and Q2 provide preamplification and equalization. Low-noise resistors are used in the bias circuit to optimize signal-to-noise ratio. C3 bypasses the input of Q1 at frequencies above the audio range to eliminate demodulation of r-f interference.
Equalization Adjust R12	Negative feedback from the collector of Q2 via C9, R12, R13 and C25 provides degenerative feedback at high frequencies to equalize playback characteristics. It is adjusted for standard output using 1 kHz and 10 kHz signals recorded on the alignment tape. The bias trap L1 and C8 eliminates bias signals in the E-to-E and record mode. A high-pass filter following C10 removes very low frequency audio components and an emitter

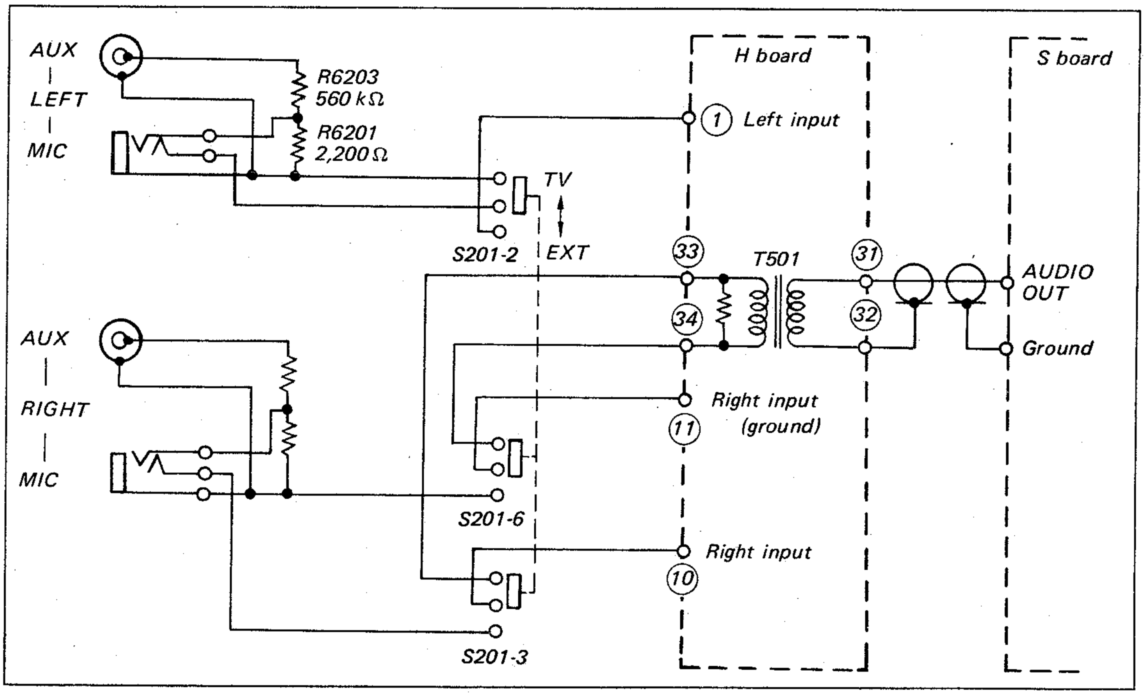


Fig. 3-26. Audio-input circuits

Buffer Q3	follower, Q3, provides the high-pass filter with a high terminating impedance.
Playback Gain R19	The playback gain control, R19 in the emitter circuit of Q3 sets overall gain to provide zero dB output using the 1 kHz signal recorded on the alignment tape. Output signals are measured at the line out terminal, TP-2.
Audio Muting Q4	Q4 is connected across the signal path at the output of the playback gain control. When muting signals are applied from the servo board (+24V during the threading/unthreading cycle) Q4 saturates shorting out audio signals.
Line Amplifier Q5	The line amplifiers provide the additional gain required to provide standard output. The signal at the collector for Q6 drives the audio L output terminal. A bias trap in the collector circuit for Q5 is tuned to 65 kHz.
VHF Buffer Q7	Emitter follower Q7 provides a low-impedance feed to the VHF AUDIO SELECT switch. This switch on the main frame, selects L, R or L + R. The L + R signal is developed in a resistor network. Output for the selector switch feeds the audio input terminal of the VHF modulator.

Record input circuits are shown simplified in Fig. 3-24. External audio from a high level source may be applied to the AUX IN phono jacks. This signal is attenuated by R6203 and R6201 to microphone level to permit use of a common preamp. The AUX IN jack is disconnected by the shorting microphone jack if a microphone plug is inserted. Externally-supplied signals are then routed through S201-2, the INPUT SIGNAL SELECTOR, to the preamp in the H board. Note that left-channel external audio is shorted out by S201-2 when the switch is set to TV.

A similar arrangement is used for the right channel as shown at the bottom of Fig. 3-24. However ground as well as the hot side of the line is switched by S201-6 and S201-3. In the TV position of S201, audio from the tuner (S board) is selected. A matching transformer, T501, on the H board adjusts impedance levels to those required at the input to the right preamp.

3-6-2. H Board

Preamplifier Q201, Q203	Input audio from S6201 applied to the H board is applied by the low-noise preamp Q201 and Q203. Dc feedback from the collector of Q203 to the emitter of Q201 via R210 for bias stabilization purposes. Ac feedback via C210 and R205 improves linearity and raises the input impedance of Q201.
Audio AGC Control Q202	AGC control is achieved by voltage divider action between the output impedance of Q201 and the collector-to-emitter impedance of Q202. The latter is controlled by bias derived from the AGC detector.
Buffer Q204	Output from the preamp is buffered by emitter follower Q204 to feed the remaining amplifiers Q205 to Q206. This section is powered only in the E-to-E, record and audio dub modes. (in the right channel Q305 to Q307 is powered only in the E-to-E and record modes.)
Drivers Q205, Q206	Amplifiers Q205 and Q206 provide sufficient gain to drive the output stage and the AGC detector.
E-to-E Level R217	R217 sets the level of signal routed to the C-R (playback circuits) Board for E-to-E operation.
Record Level R228	R228 determines the level of signal applied to the record amplifier and so determines record level.

Record Amplifier Q207	Q207 applies output signal to the left audio head via the E board. The output stage employs a tuned circuit in the emitter leg for record equalization. This circuit is adjusted for uniform record/playback response. The E board contains the Bias Oscillator operating at 65 kHz. The left record current appears at pin 12 of the E board and goes through a parallel resonant bias trap L401 and C407 to pin 7. Bias signals are added to the audio by
Bias Level C405	C405; the sum is applied to the left audio head via the C-R board. Relays RY-1 and RY-2 on the C-R board are energized in the record mode applying audio plus bias signals to the record/playback heads.
Audio AGC Q209 (Q308)	Q209 operates as a detector. It has zero base bias and receives an audio feed from the collector of Q206 via C226. Thus the average collector current used to charge C233 is proportional to audio level. The control voltage thus developed is
AGC Buffer Q210	buffered by Q210 and applied to the AGC Balancer potentiometer R249. This resistor balances the amount of AGC applied to the left (Q202) and right (Q302) AGC control stages.
Audio Record Muting Q208, Q211	The E-to-E signal feed and the AGC system is muted at the beginning of the record interval to prevent switching transients from appearing in the audio output or setting-up the AGC system. When the record button is pressed, +24 volts appears at pin 13 of the H board. Charging current of C237 and C225 holds on Q208 in saturation until the capacitors are charged fully. Q208 shorts the E-to-E signal feed during this interval. Similarly C234 in the base circuit of Q211 driving this transistor into saturation until the capacitor is charged fully. Q211 directs the AGC voltage at the emitter of Q209 to ground through D203 and R253 during this time interval.

3-7. POWER SUPPLIES

The power supply in the VO-1600 contains three regulators providing DC outputs at +24 V, +13 V, and +12 V. The 24-volt supply is used by most of the circuits and is distributed to the A-R, K, B-R, C-R, E, S and V boards. Rated load current is 850 mA in REC mode. The VHF Modulator is supplied with +12 volts, at a rated load of 80 mA. A separate rectifier and regulator supplies +13 volts at a rated load of 1.2 A to System Control (D Board). Circuit details are as follows:

T6001	Power transformer T6001 employs two secondaries supplying 26.5V and 14.5V AC. A tapped primary permits operation on 120V or 100 volts. However sets made for use in the U.S. are wired for 120-volt operation.
Bridge Rectifier D101, D102	The bridge formed of two double-diode units supplies d-c input to the 24-volt series regulator.
+24 V Regulator Q6001, Q101, Q102, D103	A sample for the 24-volt output at pin 8 is compared with a reference voltage developed across Zener diode D103 by Q102. A change in output voltage, detected by Q102 results in a change in the conduction of Q101 and Q6001 that offsets the original voltage shift.
+24V Adjust R104	R104 is set for a loaded output voltage of +24 volts ±0.2V.

+12 Volt Regulator Q103, Q104, D104	This series regulator is in series with the 24 volt supply. Voltage drops across R107 and Q103 reduces the supply voltage to +12 volts. Circuit operation is similar to that described for the 24 volt regulator except that no pre-regulator is used to drive the series regulator Q103.
+12 V Adjust R110	R110 is set for a loaded output voltage of +12 volts ±0.2V.
+13 Volt Regulator D105 – D108, Q105, Q106, D109, Q6002	A separate bridge rectifier D105 – D108 supplies the dc input to the 13-volt regulator. This circuit is similar in operation to the 12-volt supply except for the designed load current.
+13V Adjust R114	R114 is set for a loaded output voltage of 13 volts ±0.2V.

3-8. VHF MODULATOR

The VHF modulator is essentially a miniature TV transmitter. It contains AM and FM modulators to place the video and audio signals in the channel passbands of Channel 3 or 4. Channel switching is accomplished by diodes using d-c control circuitry Circuit details are as follows:

Carrier Oscillator Q5	The carrier oscillator is a common base Colpitts type using collector-to-emitter feedback via C20. Oscillation occurs at the frequencies at which the base impedance is minimum. This, in turn is determined by crystals X1 and X2 which operate at one half the Channel 3 and Channel 4 picture carrier frequencies respectively. Crystal selection is accomplished by a channel selector switch as follows: In the CH-3 position of the switch, terminal 4 of the modulator
Frequency Selectors D5, D6	is grounded. D5 is then forward biased by the positive voltage applied at its diode via L6. This returns X1 to r-f ground via C17. In the CH-4 position of the selector a positive 12 volts is applied to terminal 4. This cuts off D5 and places a forward bias on D6 via L7 and L8. Thus X2 is returned to r-f ground via the low impedance of D6 and C17. Inductors L6, L7, and L8 act to isolate the r-f circuits from the diode bias supplies.
Frequency Doubler Q6	Signals developed at the collector of Q5 are amplified by Q6 whose collector circuits is tuned to the second harmonic of the oscillator. In the CH-4 position of the channel selector, D7 is open and the primary of T2 tunes to 67.25 MHz. In the CH-3 position the cathode of D7 is grounded adding C25 to the tank circuit, thereby reducing the frequency of operation to 61.25 MHz. The secondary of T2 feeds picture carrier signal to the A-m modulator via C28 and to a frequency converter via C29.
Video Amplifiers Q1, Q2	Amplifiers Q1 and Q2 raise the video signal to the level required to drive the modulator. Input signals are clamped by D1 to the dc voltage developed across C4. R2 establishes the amplitude of signal and so determines percentage of modulation. It is set for 75% modulation. The linearity of Q1 is determined by D2 connected between the emitter and R6.
Black Stretch Adjust R6	The control R6 is set for maximum linearity in the modulated signal.
Buffer Q3	Emitter follower Q3 acts as the modulator driver to supply a low impedance source of signal to the emitter

AM Modulator
Q4

circuit of the modulator. The modulator Q4 is biased for nonlinear operation, modulates the video (sync negative) applied at the emitter by the picture carrier signal applied at the base. The collector circuit of Q4 contains a bandpass circuit that tunes to the upper sideband of the selected channel and that fraction of the lower sideband that provides vestigial sideband transmission.

Channel Select Diodes
D3, D4

Channel selection is performed by diodes D3 and D4. When the cathodes of these diodes are returned to ground by the channel selector switch (CH-3 position), added capacitance is placed across the tuned circuits of the filter. R-f output signal is tapped off at the low-impedance tap on T1 and applied to a pi-pad R21, R22, and R23, that reduces signal to the required output level.

Audio Level
R47

Audio input from the VHF AUDIO SELECT switch is applied to R47 which establishes the level of signal applied to the fm modulators. It is set for a modulation factor of at least 90% with a −6 dBm signal applied to the audio input terminal.

Audio Amplifier
Q9

Amplifier Q9 raises the Audio signal level to the value required to drive the fm modulator.

Fm Modulator
Q10

The fm modulator is an extremely stable 4.5 MHz oscillator that is frequency modulated by means of a variable capacitance diode D11. The oscillator is a Colpitts type using collector-to-base feedback via C50 and C51. Supply voltage for the oscillator is regulated by Zener diode D10 and the bias supply for the variable capacitance diode is compensated for thermal variations by thermistor TH-1.

Sound Carrier Level
R64

Frequency Converter
Q7

Signal output of the 4.5-MHz oscillator/modulator at the secondary of T5 is adjusted by R64 for the correct amplitude with respect to the picture carrier signal (13 dB below the picture carrier level). Output of R64 is applied to the frequency converter Q7. Here the 4.5 MHz from signal is heterodyned with the picture carrier signal to produce the sound carrier signal.

Sound R-F Amplifier
Q8

The primary of T3 is tuned to 71.75 MHz with C31. When the channel selector is set to CH-3, D8 conducts to add C33 and C34 to the tank circuit to reduce the operating frequency to 65.75 MHz. Signal output from the frequency converter is amplified by Q8 to the proper output level. The collector circuit of Q8 is tuned by the same type of arrangement described in conjunction with Q7.

SECTION 4
DISASSEMBLY

4-1. TOP COVER REMOVAL

1. Remove the three screws at the rear-top edge of the top cover. See Fig. 4-1. A 2.5 mm hex key is needed for this purpose.
2. Lift off the top cover.

4-2. CABINET REMOVAL

1. Lift the side of the cabinet and remove the eight screws at the bottom of the caibnet. See Fig. 4-2.
2. Remove the two screws at the rear of the cabinet as shown in Fig. 4-1.
3. Remove the top cover as described in Procedure 4-1.
4. Grasp the chassis as shown in Fig. 4-3, and lift the chassis out of the cabinet.

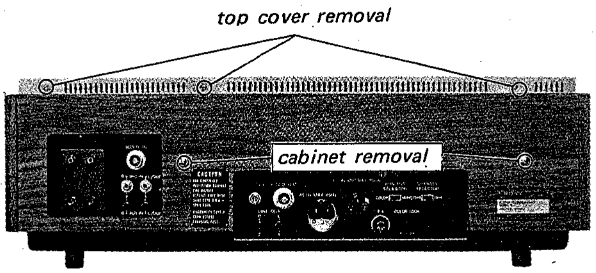

top cover removal
cabinet removal

Fig. 4-1. Rear view

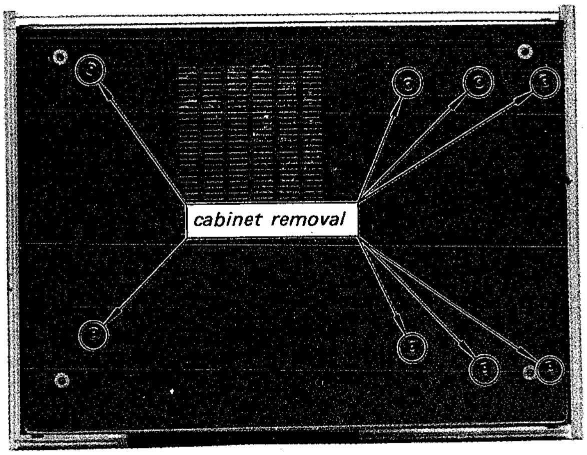

cabinet removal

Fig. 4-2. Bottom view

4-3. CONTROL PANEL REMOVAL

1. Lift the cassette loading compartment by pulling the EJECT lever toward you.
2. Remove the two screws from both sides of the loading compartment as shown in Fig. 4-4. This frees the top cover of cassette loading compartment.
3. Pull off the knobs for the EJECT lever, SKEW control, TRACKING control, UHF and VHF tuner.
4. Remove the six screws shown in Fig. 4-5.
5. Lift off the control panel.

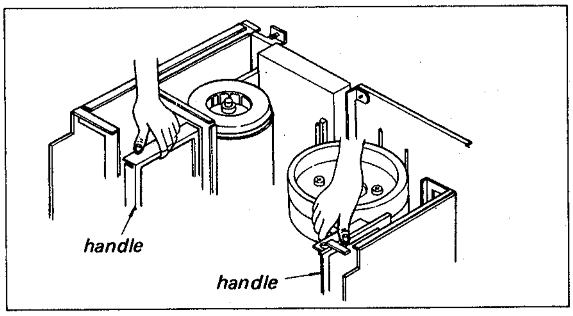

handle
handle

Fig. 4-3. Chassis removal

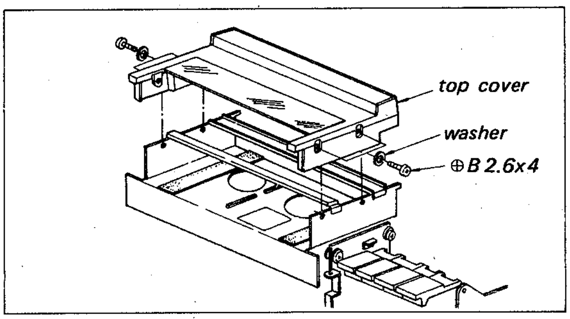

top cover
washer
⊕B 2.6x4

Fig. 4-4. Top cover removal of cassette loading compartment

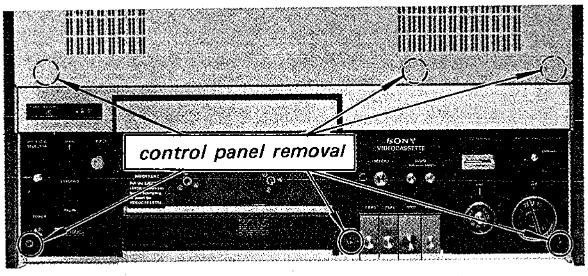

control panel removal
SONY

Fig. 4-5. Top view

4-4. RECORD-PACK REMOVAL

The record pack is mechanically free of the main chassis when the steps in Sections 4-2 and 4-3 have been completed.

To gain access to the G board for service, pull out the phono jacks near the tuning meter (VHF antenna leads to the RECORD switch) and swing the Record Pack away from the main chassis.

To service the Record pack in the TV mode, connect a short jumper between the hot leads of the phono jacks near the tuning meter. This completes VHF antenna input connections.

4-5. CASSETTE LOADING COMPARTMENT ASSEMBLY REMOVAL

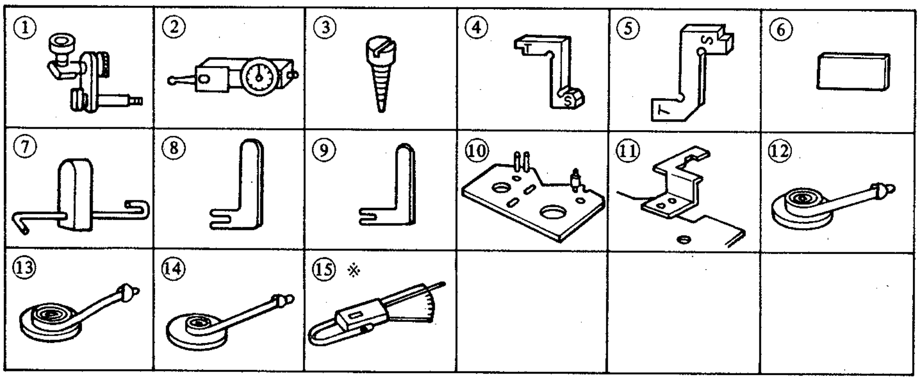
1. Remove the four +P 3x6 screws that secure the cassette holder to the chassis.
2. Lift off the cassette loading compartment assembly.

Note: Jig Code Numbers are stamped on the jigs.
※ All spring gauges are available from local sources in U.S.

JIG TABLE

Description	Part No.		Jig Code No.	Reference Sketch No.
	Former	New		
Upper Head Drum Alignment Jig	X-03261-04-0 VA-0052	3-702-211-01	TD-052	①
Eccentricity Gauge (should be used with upper head drum alignment jig)		7-732-040-10		②
Dihedral Adjustment Screws (4)	0-324-059-00 VA-0051	3-702-210-01	TD-051	③
Reel-Table Height Adjustment Jig	0-328-121-01 VA-0047	3-702-207-01	TD-047	④
Tension-Arm Height Adjustment Jig	0-328-091-00 VA-0017	3-702-206-01	TD-046	⑤
Audio/Control Head Adjustment Jig	0-328-067-00 VA-0004	3-702-201-01	TD-004	⑥
Threading Ring Drive Pulley Retraction Jig	0-327-170-00	3-702-222-01	TD-513	⑦
Tension Arm T Bending Jig	0-327-108-00 VA-0027	3-702-204-01	TD-027	⑧
Tension Arm S Bending Jig	0-328-107-00 VA-0026	3-702-203-01	TD-026	⑨
Back Tension Adjustment Jig	X-03282-41-0 VA-0058	3-702-216-01	TD-058	⑩
Tension Arm Position Jig	X-36322-44-0 VA-0049	3-702-224-01	TD-530	⑪
Dummy Reel Pack (100 mm dia) (reel table torque adj.)	VA-0056	3-702-215-01	TD-056	⑫
Dummy Reel Pack (118 mm dia) (forward back tension adj.)	VA-0055	3-702-214-01	TD-055	⑬
Dummy Reel Pack (39 mm dia) (forward back tension adj.)	VA-0054	3-702-213-01	TD-054	⑭
※Spring Gauge (20 g maximum)		7-732-050-10		⑮
※Spring Gauge (50 g maximum)		7-732-050-20		⑮
※Spring Gauge (100 g maximum)		7-732-050-30		⑮
※Spring Gauge (200 g maximum)		7-732-050-40		⑮
※Spring Gauge (500 g maximum)		7-732-050-50		⑮

JIG SKETCHES



SECTION 5
MECHANICAL MAINTENANCE

PRECAUTIONS

1. To operate the deck while it is out of the cabinet, and with no cassette in place, short the terminals of the Cassette Loaded microswitch S6009 with a short clip lead. The switch is located at the front of the machine, just forward of the take-up reel spindle.
2. To operate the deck without a cassette, it is necessary to disable the photo transistor that activates the auto stop system. A cap of black opaque material placed over the photo transistor will disable the auto stop system. The cap of a ball-point pen will suffice.
3. To operate the deck with the Cassette loading compartment removed, be sure that the cassette is seated properly on the reel spindles. There should be no space between the reel turntables and the bottom of the reel hubs inside the cassette.
4. Stand the deck in the normal operating position for service or on the side of the deck close to the power switch (left side as you face the front of the machine). Do not stand the deck on any other side.
5. Machine compatibility (interchangeability of tapes between individual machines) depends upon very close mechanical tolerances. The tape path and threading mechanism are factory adjusted and should not require realignment under normal circumstances. Therefore, do not attempt adjustment of the tape guides or the threading guides.
6. Use utmost care in replacing parts on or near the tape guides, head drum assembly or the threading guides. The slightest deviation in the tape path can make the rotating video heads fail to track the paths of previous recordings.

TABLE 5-1. JIGS REQUIRED FOR MECHANICAL ADJUSTMENTS

Description	Part Number	Remarks
Alignment Tape (RR-5-1)	96-0005-01	Tape Pass and Electrical Adj.
Upper Head Drum Alignment Jig	3-702-211-01	Upper Head Drum Replacement
Eccentricity Gauge	7-732-040-10	
Dihedral Adjustment Screws (4)	3-702-210-01	-------------------
Reel-Table Height Adjustment Jig	3-702-207-01	-------------------
Tension-Arm Height Adjustment Jig	3-702-206-01	-------------------
Audio/Control Head Adjustment Jig	3-702-201-01	Head Azimuth Adj.
Tension Arm T Bending Jig	3-702-204-01	Tension Arm, Tape Guide Adj.
Back Tension Adjustment Jig	3-702-216-01	-------------------
Tension Arm Position Jig	3-702-224-01	-------------------
Tension Arm S Bending Jig	3-702-203-01	Tension Arm, Tape Guide Adj.
Dummy Reel Pack (39 mm dia)	3-702-213-01	Playback Tension Adj. at tape end
Dummy Reel Pack (118 mm dia)	3-702-214-01	Playback Tension Adj. at tape start
Dummy Reel Pack (100 mm dia)	3-702-215-01	REW, FF and FWD Torque, Brake, REW Back Tension, Threading Back Tension, Threading Brake

Note: To avoid confusion, use new part number when ordering adjustment jigs.

7. If it necessary to rotate the Threading Ring by hand to check for mechanical action, do not grasp the tape guides. Insert the tip of a Phillips-head screwdriver into one of the holes in the Threading Ring and push the Threading Ring around with the screwdriver.
8. If it is necessary to rotate the ac drive motor by hand, turn it in the direction shown by the arrow affixed to the motor fan. If the motor is turned in the opposite direction, one of the drive belts will work its way off the pulley.
9. To disable the Record Safety Switch, S6016, hold the actuator wire down with a short length of adhesive tape.

5-1. CLEANING THE PLAYBACK HEADS AND TAPE PATH

Video heads can be cleaned by playing the Cleaning Cassette KC-IC. Do not play the Cleaning Cassette for more than 30 seconds (a count of 10 on the tape counter). Do not rewind the Cleaning Cassette after each pass but rewind the cassette completely after it has been used once throughout its length. The cleaning cassette is good for four or five passes, it should then be replaced.

For routine shop maintenance it is recommended that the video heads, audio/control track heads, the tape bearing surface of the rotary head drum assembly and all tape guides be cleaned by wiping the surfaces with a piece of chamois saturated with methanol or M/S-Brand magnetic head cleaner.

WARNING

Never try to clean the heads with the motor running.

5-2. DEGAUSSING

Demagnetize video, audio and control track heads with a head demagnetizer. Bring the tip of the demagnetizer as close as possible to the head tip without actually contacting the head tip. Withdraw the demagnetizer very slowly and turn off power after the demagnetizer is at least three feet away from the deck.

CAUTION

The demagnetizer should not be allowed to touch the video heads.

5-3. LUBRICATION

To lubricate the Reel Table shafts, remove the 3 mm screw and washer at the top of the shaft. Lift the Reel Table slightly and apply one drop of oil to the inner surface of the Reel Table bearing. This should be done if the Reel Table does not turn smoothly and when a new Reel Table is installed. See Fig. 5-1.

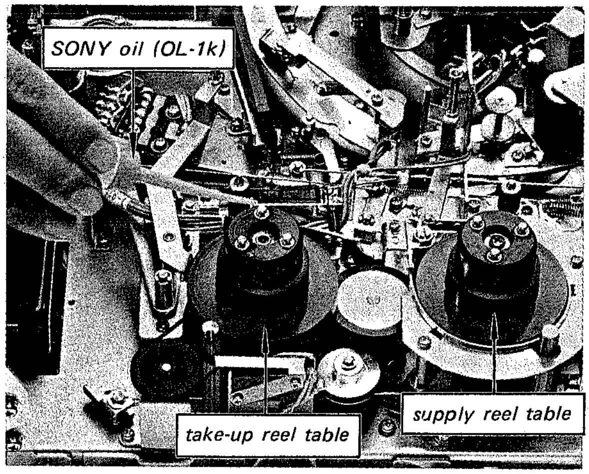


Fig. 5-1. Lubrication of the reel tables

5-4. VIDEO HEAD REPLACEMENT

Video head replacement is required when the heads are damaged or have open coils. In addition, insufficient tip penetration, resulting from head wear after long periods of operation, may necessitate replacement. Heads are replaced by replacing the upper Head-Drum Assembly. Do not attempt replacement of individual head chips. To remove and replace the rotary Head Assembly (the upper cylinder on which the two video heads are mounted) proceed as follows:

CAUTION

The video Head Assembly and the surrounding machined parts are very precisely made. Use utmost care when performing any work on the rotary head drum assembly.

Removal

1. Turn off the power.
2. Unsolder the two white and two red wires where they are connected to the terminals of the rotary transformers.

3. Hold the upper drum assembly to keep it from rotating and remove the two Phillips head screws that secure the upper Head-Drum Assembly to the drive flange.
4. Lift off the upper Head-Drum Assembly.
   DO NOT remove the shim on the mounting flange.
   DO NOT loosen the hex nut on the spindle of the drive shaft.

Replacement

1. Wipe the replacement upper Head-Drum Assembly with a lint-free cloth dampened with alcohol to clean the outer circumference and the bottom surface.
2. Place the upper Head-Drum so that the hole through which the white leads extend is close to the small drill mark on the mounting platform. Position the upper Head-Drum over the mounting holes.
3. Install the Phillips-head screws that secure the upper Head-Drum Assembly. Thread them snug, but do not tighten.
4. Solder the red and white leads to the terminals of the rotary transformer.
5. Install the Eccentricity Gauge as shown in Fig. 5-2 by threading the lower part of the fixture into the threaded hole on the lower Head-Drum Assembly near the entrance guide, as shown in Fig. 5-3. Tighten the knurled parts securely.
6. Adjust the gauge mount so that the tip of the actuating lever bears against the circumference of the upper Head-Drum Assembly between the two lower grooves on the Head-Drum Assembly.

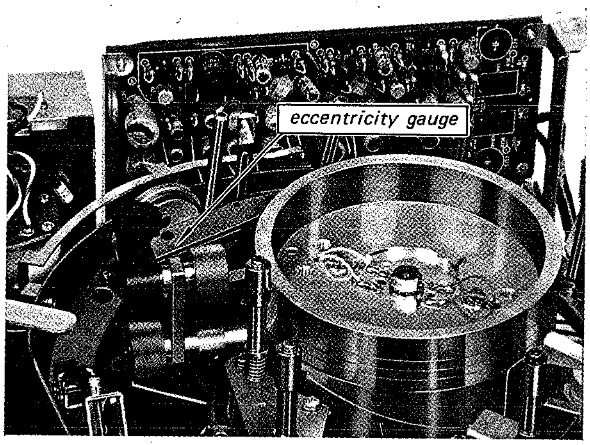


Fig. 5-2. Installation of the eccentricity gauge

The dial reading should be made to increase by 30 – 50 units compared with the reading when the actuating lever is not in contact with the surface.

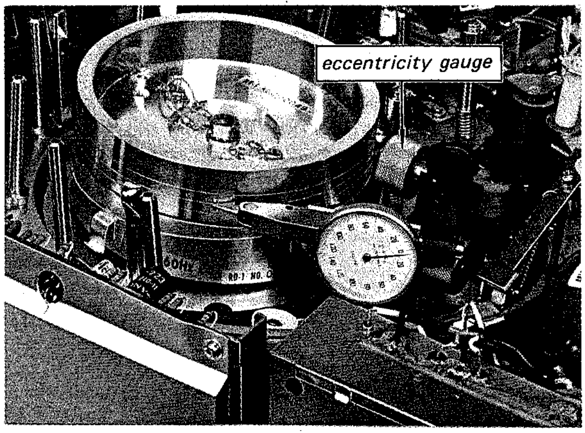


Fig. 5-3. Operation of the eccentricity gauge

7. Rotate the Head-Drum Assembly by turning the fan mounted on the motor shaft in the direction indicated by the arrow on the fan.
8. Check total eccentricity. It should not exceed 10 microns peak to peak. If it does, proceed to the next step.
9. Rotate the Head-Drum Assembly until the gauge indicates greatest deflection. Tap the inner circumference of the upper Head-Drum Assembly lightly with the plastic handle of a screwdriver at a point 180° away from point where the gauge touches the head drum.
10. Test for eccentricity and repeat Step 9 until the total deflection is less than 10 microns.
11. Tighten the mounting screws gradually while repeating the eccentricity test. Make a final test when the screws are fully tightened.
12. Remove the Eccentricity Gauge and fixture.

Video Head Dihedral Adjustment

Dihedral adjustments are very seldom required when replacing the Upper Head-Drum Assembly. However, if dihedral is incorrect (heads are not precisely 180° apart) a form of distortion shown in Fig. 5-4 (a) will be seen on the monitor during playback. This condition is seen more readily on monitors with relatively long time constant filters in their horizontal AFC circuits.

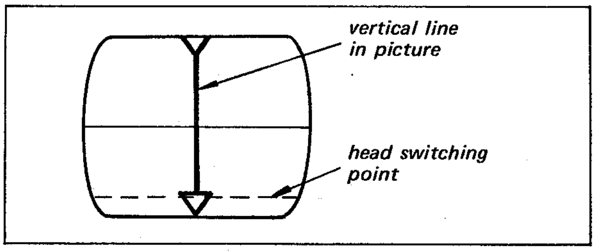


Fig. 5-4 (a). Diheadral error appears as a stationary split in vertical lines in the picture. It is most evident at the switching point and continues at the top of the picture.

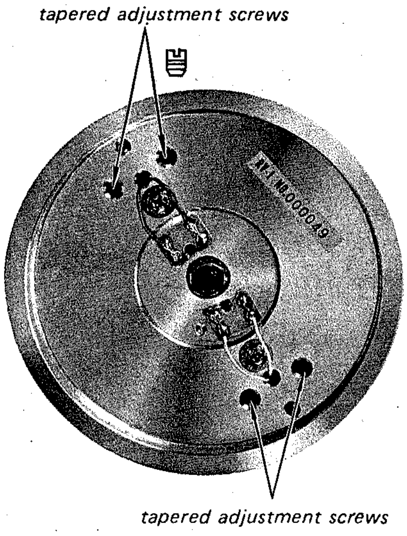


Fig. 5-4 (b). Dihedral error correction

To adjust dihedral, it is necessary to install tapered adjustment screws at the threaded holes on either side of the video head assemblies. See Fig. 5-4 (b). The part number for these adjusting screws is 3-702-210-01.

1. Install screws in each of the four holes, but do not run them all the way down. Four screws are needed to maintain balance even if only one of the screws requires adjustment.
2. Turn one of the screws down until the screw touches the head base. Turn this screw one additional quarter turn.
3. Playback the Alignment Tape and check for dihedral distortion at the top of the picture (or at the bottom, at the switching point).
4. If the situation has improved, turn off the deck and advance the screw identified in Step 2 another quarter turn. Continue Steps 3 and 4 until all dihedral error is removed.
5. If the situation got worse in Step 3, unscrew the screw identified in Step 2 and turn down the screw on the opposite side of the same video head. Advance this screw in quarter turn steps, and check playback between each step.
6. Remove the tapered screws when adjustment is complete.

5-5. PG COIL REPLACEMENT

There are two 30 PG coils beneath the Upper Head-Drum assembly. To replace either coil, proceed as follows:

1. Unsolder the leads of the defective PG coil where they connect to the terminals of the B-R board.
2. Remove the two P4 x 10 screws that secure the Upper Head-Drum Assembly to the rotating platform. Remove the Upper Head-Drum Assembly. See Fig. 5-5.

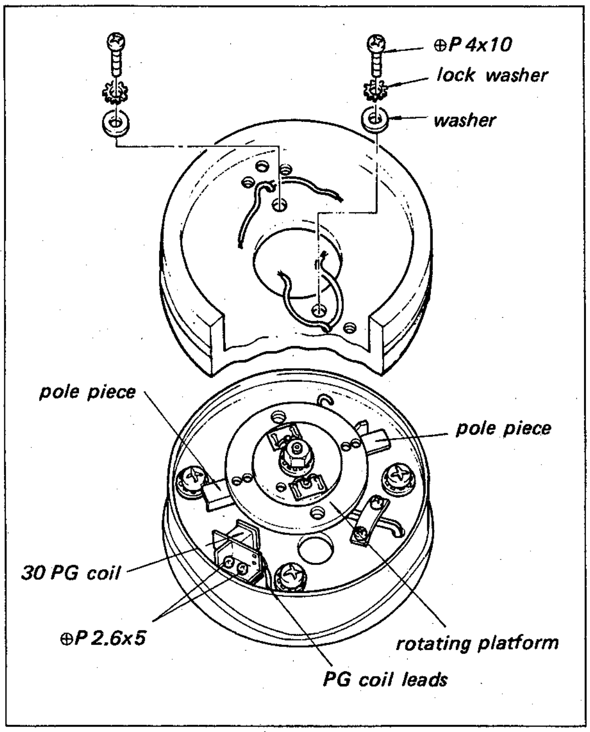


Fig. 5-5. 30 PG coil replacement

3. Remove the two P2.6 x 5 screws that secure the defective PG coil bracket to the Lower Head-Drum Assembly. If a spacer is used under the original coil, leave it in place.
4. Feed the leads for the new coil through the hole in the Lower Head-Drum Assembly and solder these leads to the correct terminals on the B-R board.

5. Install the two P2.6 x 5 screws and align the poles of the coil with the pole piece mounted on the rotating platform. Position the platform so that the two pole pieces are aligned perfectly with both 30 PG coils and adjust the position of the new coil so that it is 180° away from the remaining coil. Use the pole piece assembly as a guide.
6. Check the clearance between the poles of the new coil and the pole pieces. Clearance should be between 0.1 to 0.4 mm. Add or remove spacers as necessary.
7. Reinstall the Upper Head-Drum Assembly as directed in Section 5-4.
8. Reset head switching as directed in Section 7-5.

5-6. AUDIO/CONTROL-HEAD REPLACEMENT

A defective audio/control head can be replaced without upsetting servo tracking as follows: Height, azimuth and tilt will have to be adjusted, however.

1. Unsolder the leads at the rear of the audio/control head.
2. Remove screws A and B shown in Fig. 5-6. Do not lose the spring under screw A. Do not loosen the screws in the long slots.
3. Install the Head Mounting Plate Assembly using the original screws A and B. The spring on screw A goes between the head of the screw and the mounting plate. Keep the original spacer beneath the head assembly.

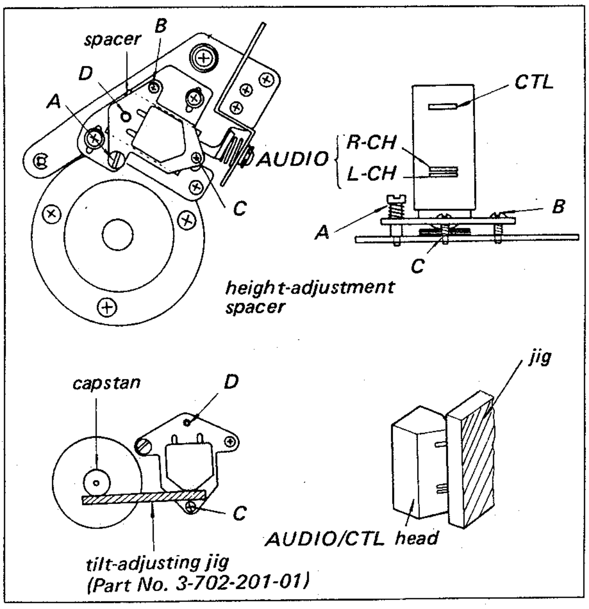


Fig. 5-6. Audio/Control head replacement and adjustment

4. Adjust the front surface of the head to be paralleled with the capstan using screws C and D. Adjustment jig (Part No. 3-702-201-01) is used to set parallelism between the capstan and the head as shown in the lower details of Fig. 5-6.
5. Reconnect the leads at the rear of the Audio/Control Head.
6. Connect a scope or ac VTVM to TP-2 or TP-102 of the C-R board. Playback the 10 kHz segment of the Alignment Tape.
7. Adjust the height of the head, using appropriate spacers for maximum output. There are four spacers available as follows:

Part No.	Thickness
3-630-483-01	1.2 mm
3-630-483-11	0.5 mm
3-630-483-21	0.2 mm
3-630-483-31	0.1 mm

8. Playback the 10 kHz segment of the Alignment Tape and adjust azimuth using screw B (screw A should be fully tightened) for maximum output.
9. A precise adjustment of azimuth can be done by using a scope with identical horizontal and vertical amplifiers and connecting the vertical and horizontal inputs to TP-2 and TP-102 of the C-R board respectively. Playback the 10 kHz segment of the Alignment Tape and adjust azimuth (screw B) for zero phase as indicated by a 45°-line Lissajous pattern.

5-7. ERASE HEAD REPLACEMENT

1. Remove the shield plate for erase head by loosening the screw A shown in Fig. 5-7.
2. Unsolder the leads at the rear of the erase head.
3. Remove the screw B shown in Fig. 5-7. Do not lose the spring under screw B. Do not loosen the screw C.
   This frees the erase head along with its housing.

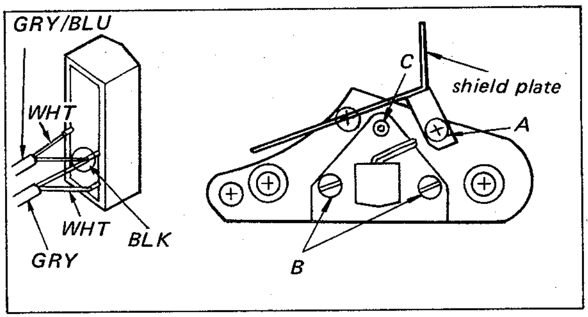


Fig. 5-7. Erase head replacement

4. Install the new erase head to the housing, and then reverse the foregoing procedures. The spring on screws B goes between the head of screw and the housing.
   Keep the original spacer beneath the housing.
5. Adjust the height of the head, using appropriate spacers to make the top and bottom edge of the erase head cores appears equally as shown in Fig. 5-8. There are five spacers available as follows:

Part No.	Thickness
3-630-031-01	0.1 mm
3-630-031-11	0.2 mm
3-630-031-21	0.5 mm
3-630-031-31	1.0 mm
3-630-031-41	0.05 mm

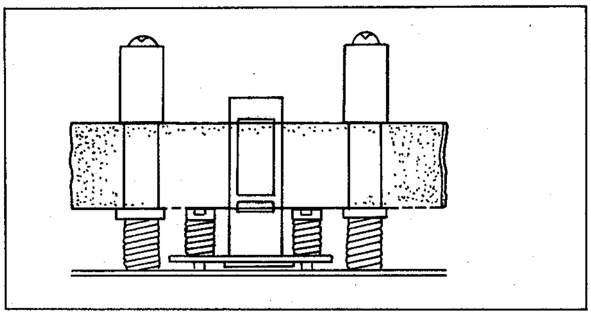


Fig. 5-8. Erase head height adjustment

6. After completing the head height adjustment, perform angle adjustment by loosening the screw B as shown in Fig. 5-9.

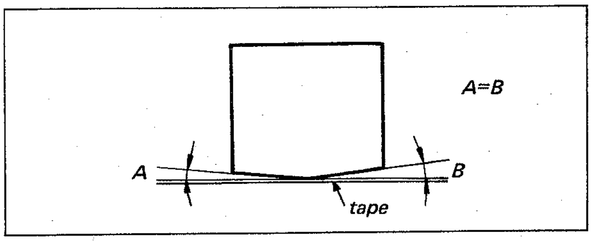


Fig. 5-9. Erase head angle adjustment

5-8. AC MOTOR REPLACEMENT

1. Remove the four PS3 x 6 screws that secure the diagonal chassis brace. Remove the brace.
2. Remove the three drive belts from the motor pulley.
3. Loosen the two 3 mm set screws and pull off the drive pulley.
4. Remove the screws at the top edge of the A-R board and swing the top of the board out and down to gain access to the terminal strip.
5. Unsolder the motor leads at the terminals numbered 1, 2 and 3.
6. Remove the four 4 mm screws that secure the motor to the chassis. Lift out the motor.
7. Transfer the shield belt from the old motor to the replacement.
8. Install the new motor so that the leads come out adjacent to the terminal strip. Install the four 4 mm mounting screws.
9. Solder the leads to the terminal strip as follows:
   White – 1, Black – 2, Green – 3
10. Install the motor pulley and adjust the distance between the pulley and the chassis as shown in Fig. 5-10. Tighten the two set screws.
11. Reinstall the drive belts. The dull sides of the two flat belts ride against the pulley drive surfaces.
12. Perform head drum free-running speed check as described in Procedure 7-1.
13. Replace the diagonal chassis brace.

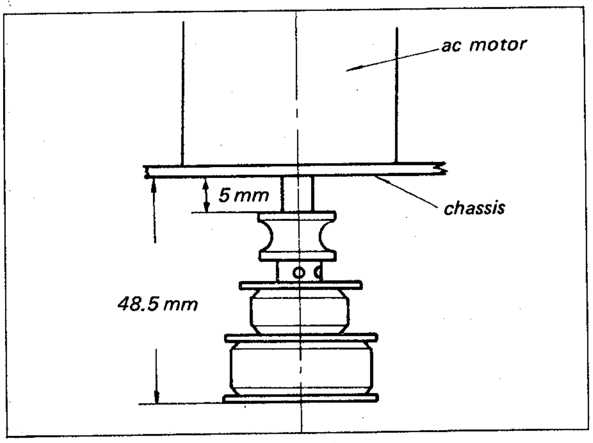


Fig. 5-10. Motor pulley height setting

5-9. PINCH ROLLER REPLACEMENT

Replace a worn or damaged pinch roller as follows:

1. Remove the two M3 x 6 knurled Allen-Head screws B on the Pinch Roller Assembly. See Fig. 5-11 (a).
2. Install the replacement pinch roller assembly using the same screws. The screws may be made snug temporarily until the next adjustments are completed.

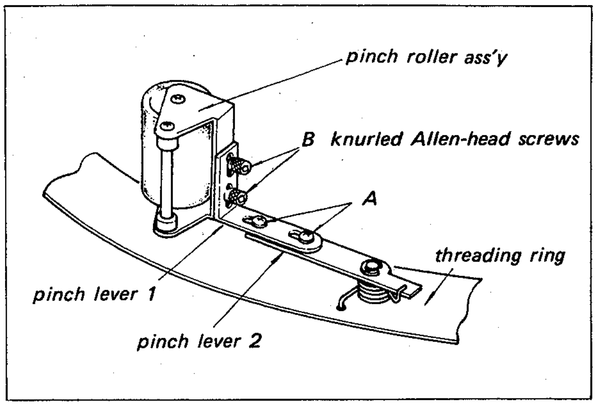

pinch roller ass'y
B knurled Allen-head screws
A
threading ring
pinch lever 1
pinch lever 2

Fig. 5-11 (a). Pinch roller replacement and adjustment

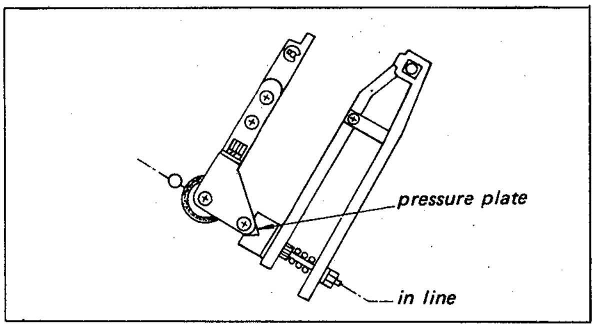

pressure plate
in line

Fig. 5-11 (b). Pinch roller replacement and adjustment

3. Move the Threading Ring by hand to the play position. Loosen the screws A in Fig. 5-11 (a) and set the Pinch Roller Pressure Plate, the Pinch Roller and the Capstan in a straight line. See Fig. 5-11 (b). Tighten the screws A.
4. Loosen the knurled Allen-head screws B and adjust the Pinch Roller to be parallel with the capstan while adjusting the height of the Pinch Roller Assembly so that the Pressure Plate is centered vertically against the Pinch Roller Assembly. Tighten the knurled Allen screws B .
5. Check to see that the Pinch Roller is parallel with the capstan as shown in Fig. 5-11 (c). Install a shim between Pinch Lever parts 1 and 2 to effect parallelism.
6. Move the Pressure Plate by hand to press the pinch roller against the Capstan. If the top and bottom of the pinch roller do not press equally against the capstan, loosen the knurled Allen-head screws on the Pressure Arm and adjust the Pressure Plate using an RT spacer as shown in the detail of Fig. 5-11 (d).

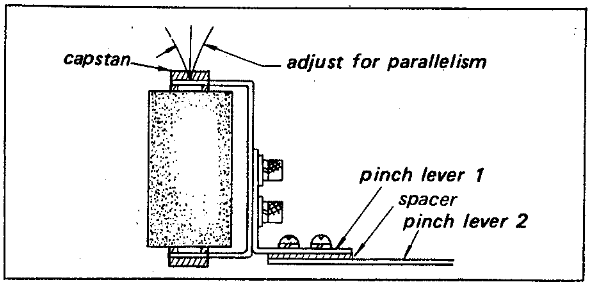

capstan
adjust for parallelism
pinch lever 1
spacer
pinch lever 2

Fig. 5-11 (c). Pinch roller replacement and adjustment

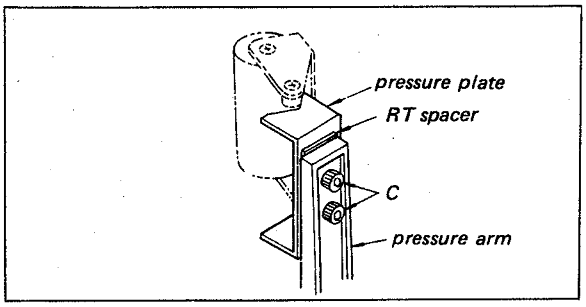

pressure plate
RT spacer
C
pressure arm

Fig. 5-11 (d). Pinch roller replacement and adjustment

5-10. FAST FORWARD/REWIND DRIVE WHEEL REPLACEMENT

1. Remove the rubber drive belt just below the drive wheel.
2. Loosen the two 3 x 6 Allen head set screws (between the drive wheel and the pulley). See Fig. 5-12. A 1.5 mm hex key is required. Back the screws out quite far to clear the shoulder on the shaft.
3. Pull the drive pulley down from beneath the chassis to free the Drive Wheel. Be careful not to misplace a nylon washer beneath the drive wheel.

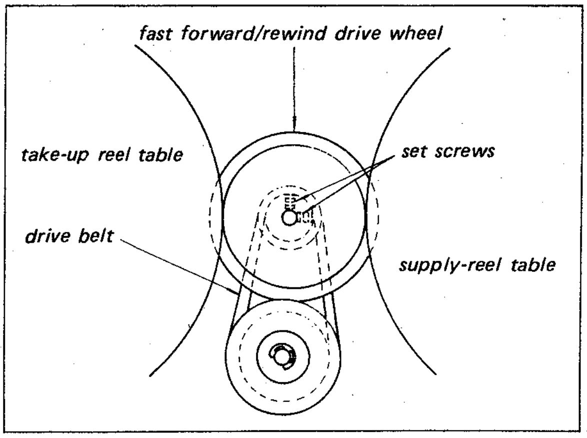

fast forward/rewind drive wheel
take-up reel table
set screws
drive belt
supply-reel table

Fig. 5-12. Drive wheel replacement

4. Work out the Drive Wheel from the front of the machine.
5. Replace the Drive Wheel and belt by reversing the above procedure. Set the Drive Wheel for a 0.1 mm vertical play on the drive shaft.
6. Check REW and FF Torque. See Section 5-13.

5-11. THREADING RING DRIVE WHEEL REPLACEMENT

1. Retract the Threading Ring Drive Pulley Lever with your fingers or a retraction jig (3-702-222-01).
2. Loosen the 3 x 3 set screw (1.5 mm Allen Key) and pull off the Threading Ring Drive Wheel.
3. Replace the drive wheel and set for 0.1 mm vertical play in the drive wheel shaft.

5-12. REEL TABLE REPLACEMENT

Reel tables require replacement if noise or vibration is evident due to the limiter or clutch springs (See Fig. 5-13 (a).) or if the torque of the Reel Tables is nonuniform. Remove the cassette loading compartment first and then, replace the Reel Tables as follows:

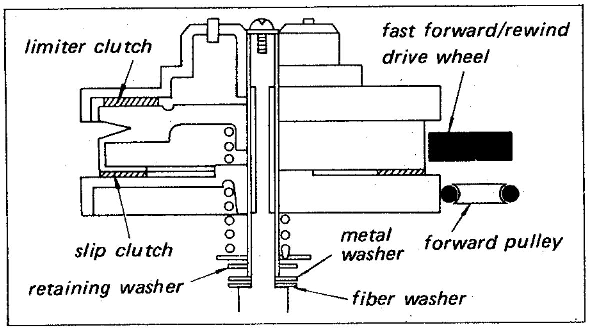

limiter clutch
fast forward/rewind drive wheel
slip clutch
retaining washer
metal washer
forward pulley
fiber washer

Fig. 5-11 (a). Cross section of take-up reel table

Supply Reel Table

1. Remove the B3x6 screw (black) at the shaft of the Reel Table.
2. Move the Brake Chassis Assembly clockwise (See Fig. 5-13 (b).) and pull up the Reel Table. Be careful not to misplace a fiber washer (if used) beneath the Reel Table.
3. Wipe out the shaft hole in the replacement Reel Table and apply a drop of SONY OL-1K oil to the inner surface.

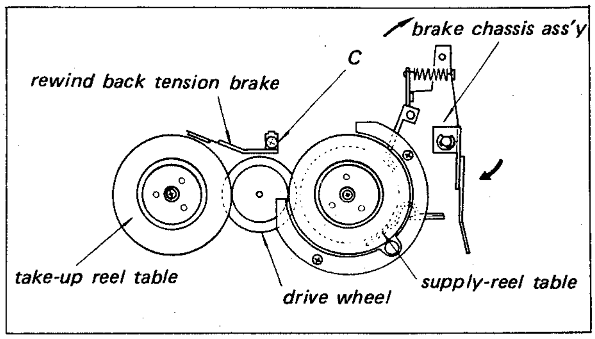

brake chassis ass'y
C
rewind back tension brake
take-up reel table
drive wheel
supply-reel table

Fig. 5-13 (b). Reel table replacement

4. Move the Brake Chassis Assembly to the right to provide as much slack as possible on the Brake Band. Install the Reel Table. Be careful not to bend the Threading Back Tension Assembly underneath the Reel Table.
5. Check the height of the Reel Table using the gauge shown in Fig. 5-14 (Part No. 3-702-207-01). If height is incorrect, add or subtract fiber washers (5 mm dia, 0.3 mm thickness) and metal washers (5 mm dia, 0.1 mm).

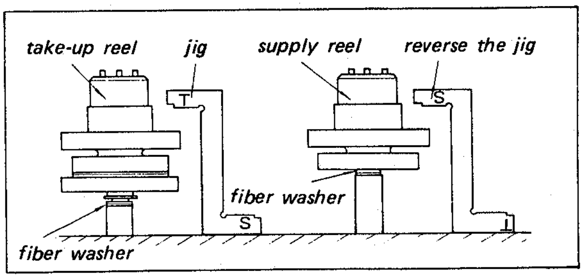

take-up reel
jig
supply reel
reverse the jig
T
S
fiber washer
S
T
fiber washer

Fig. 5-14. Use of the jig to check reel table height

6. Install the B3 x 6 screw and washer and check for vertical play in the assembly. There should be perceptible vertical play left.
7. Check back tension as direction in Section 5-15.

Take-up Reel Table

1. Remove the B3 x 6 screw (black) at the shaft of the Reel Table.
2. Remove screw C in Fig. 5-13 (b) and remove the Rewind Back Tension Brake Assembly.
3. Remove the Counter Belt from the Counter Pulley.
4. Remove the Drive Wheel as described in Section 5-10, and then pull up the Reel Table. Be careful not to misplace the fiber washer (if used) beneath the Reel Table.

5. Wipe out the shaft hole of the replacement table and apply a drop of SONY OL-1K oil to the inner surface. Place the counter drive belt on the new reel table.
6. Place the Take-Up Reel Assembly on the shaft. Push the Drive Wheel to the right to lower the table into place.
7. Check the height of the Reel Table above the chassis using the jig shown in Fig. 5-14. Add or subtract fiber washers (6 mm dia, 0.3 mm thickness) to correct the height.
8. Install the B3 x 6 screw and washer. Check for a perceptible vertical play on the shaft (It should not be perfectly tight.).
9. Replace the Rewind Back Tension Brake Assembly and position the counter drive belt on the counter pulley.
10. Adjust back tension as directed in Section 5-15.

5-13. DRIVE TORQUE CHECKS

Drive torque should be checked whenever the Reel Tables or Drive Wheel is replaced.

Rewind Drive Torque

1. Place the Back Tension Adjustment jig over both Reel Tables (Part No. 3-702-216-01). See Fig. 5-15 (a).
2. Place a dummy reel pack (100 mm dia, Part No. 3-702-215-01) on the Supply Reel Table.

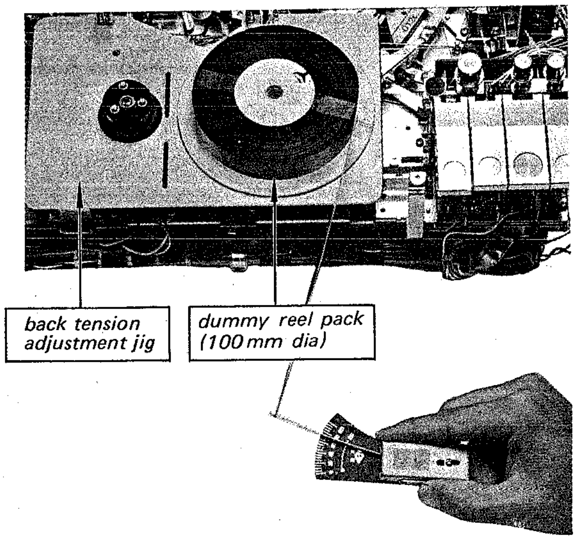


Fig. 5-15 (a). Drive torque check setup

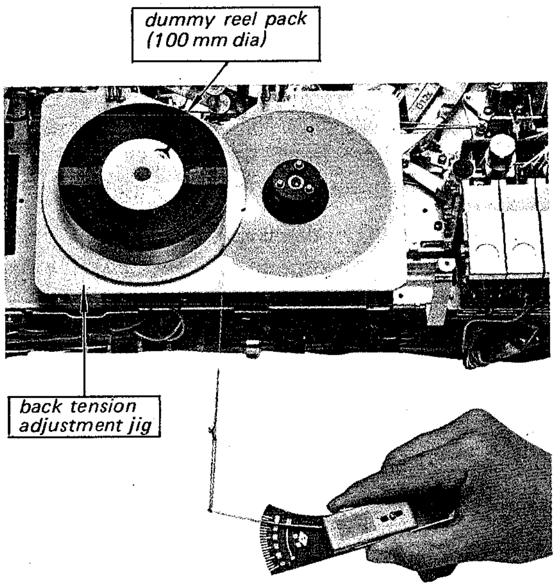


Fig. 5-15 (b). Drive torque check setup

3. Attach a spring scale to the end of the tape and hold the scale as shown in Fig. 5-15 (a).
4. Press the REWIND button and hold the tape so that the clutch slips. The scale reading should be 200 to 340 grams for a torque of 1 to 1.7 kg-cm.
5. Stall the Reel Table by hand and check to see that the mechanical limiter is functioning.

FF Torque Check

1. Depress the FF button.
2. Hold the Take-Up Reel Table by hand to check to see if the mechanical limiter is working (Reel table slips at the limiter only.).
3. Stop the machine and set the Back Tension Adjustment jig in place on both reels.
4. Place a dummy reel pack with a 100 mm diameter on the Take-Up Reel Table. Hold the end at the spring scale as shown in Fig. 5-15 (b).
5. Press the FF button.
6. Measure torque while the table is slipping at the limiter. The correct reading is 200 to 340 grams (1.0 to 1.7 kg-cm).

FWD Drive Torque Check

1. Cover the photo transistor with a black pen cap.
2. Press the PLAY button and grasp the Take-Up Reel Table by hand to make sure that the Table slips at the limiter.

3. Stop the machine and place the Back Tension Adjustment Jig (Part No. 3-702-216-01) over both reel tables. Place a dummy reel pack (100 mm dia; Part No. 3-702-215-01) on the Take-Up Reel Table. Hold the end of the tape with the spring scale. See Fig. 5-15 (b).
4. Press the Play button and move the tape end to simulate a tape speed of 3-3/4 i.p.s. The scale measurement should be between 84 and 104 grams. (420 to 520 g-cm). For out of tolerance readings, replace the reel table. If the drive surfaces slip rather than the limiter, or clutch, check the drive surfaces and pressures.

5-14. STOP BRAKE ADJUSTMENTS

Brake torque should be checked when the Sub Chassis, the Brake Chassis Assembly or the Supply Reel Tables are replaced or serviced.

1. Check to see that the brake pad is tangent to the Supply Reel Table. See Fig. 5-16. Bend the Brake Lever at point A if necessary.
2. Check to see that the right edge of the Brake Chassis Assembly is at right angles to the rear edge of the Subchassis. See Fig. 5-16. Bend the stopper B to make it so.
3. Push the STOP button and place a dummy reel pack (100 mm dia; Part No. 3-702-215-01) on the Supply Reel Table. Measure torque in both clockwise and counterclockwise directions.

clockwise - 200 g to start slipping
counterclockwise - less than 100 g to start slipping

If brake is off limits in the clockwise direction, adjust the Spring Anchor marked C in Fig. 5-16.

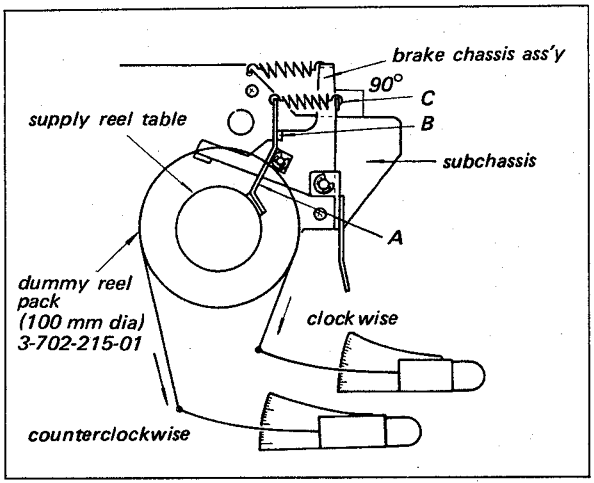

brake chassis ass'y
90°
C
B
supply reel table
subchassis
A
dummy reel pack (100 mm dia) 3-702-215-01
clockwise
counterclockwise

Fig. 5-16. Stop brake adjustment

5-15. TENSION REGULATOR ADJUSTMENTS

Remove the cassette loading compartment first, and then perform the following adjustments.

Adjustment of Tension Arm S
(Refer to Fig. 5-17 and 5-18)

1. Place the Tension Arm Position Jig (Part No. 3-702-224-01) on both Reel Tables.

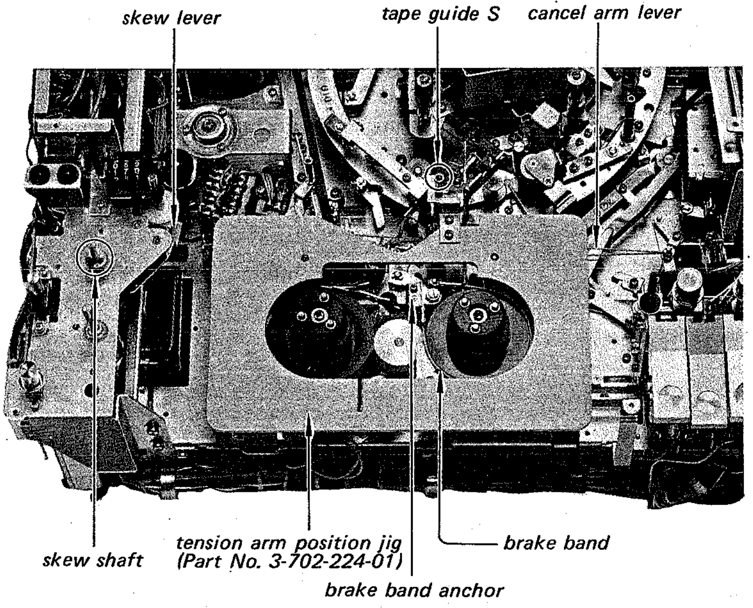

skew lever
tape guide S
cancel arm lever
skew shaft
tension arm position jig (Part No. 3-702-224-01)
brake band
brake band anchor

Fig. 5-17 (a). Setup for checking the back tension regulator

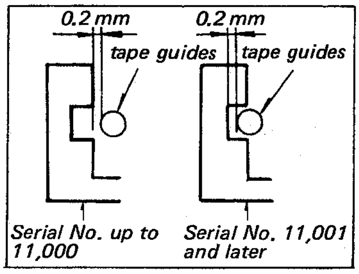

0.2 mm
0.2 mm
tape guides
tape guides
Serial No. up to 11,000
Serial No. 11,001 and later

Fig. 5-17 (b). Brake band anchor adjustment

2. Set the SKEW control to midrange.
3. Depress the PLAY button.
4. Turn the Supply Reel Table clockwise slowly by hand.
5. Adjust the position of the Brake Band Anchor (loosen the mounting screw) for 0.2 mm clearance between the bracket on the jig and Tape Guide S. See Fig. 5-17 (b).
6. Set SKEW fully clockwise. Remove the jig.
7. Press the PLAY button and check for 0.2 to 1.0 mm clearance between Tension Arm S and the pin in the linkage of the Arm Cancel Lever. See Fig. 5-18. Adjust the tang of the Arm Cancel Lever to the left or right to obtain the correct clearance.
8. Press the Stop button and check for 1.5 to 2.5 mm clearance between Tension Arm S and the Cassette Opener Plate. Readjust the tang of the Tension Arm Cancel Lever if necessary.

Tension Arm Height Adjustment

1. Check for perpendicularity and height of Tension Arm S with the jig (Part No. 3-702-206-01). Place the short base of the jig against the main chassis to the left of the Capstan Bearing as shown in Fig. 5-19.
2. Bend Tension Arm S with the bending jig (Part No. 3-702-203-01) to secure proper alignment.
3. To check for perpendicularity and height at Tension Arm T, reverse the jig as shown in Fig. 5-19. Remove one mounting screw from the Guide Rail to make room for the jig.
4. Bend Tension Arm T with the bending jig (Part No. 3-702-204-01) to secure the correct setting.
5. Replace the screw in the Guide Rail when adjustment is complete.

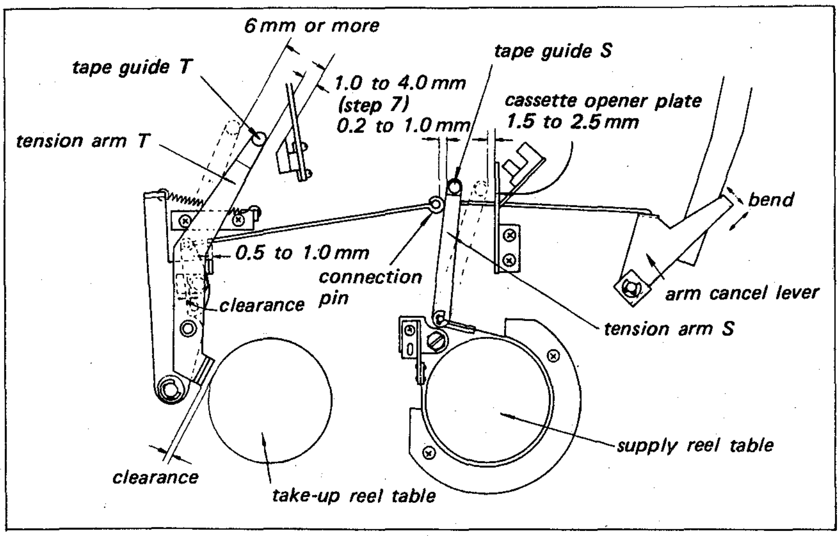

6 mm or more
tape guide S
tape guide T
1.0 to 4.0 mm (step 7)
0.2 to 1.0 mm
cassette opener plate 1.5 to 2.5 mm
tension arm T
bend
0.5 to 1.0 mm
connection pin
clearance
arm cancel lever
tension arm S
supply reel table
clearance
take-up reel table

Fig. 5-18. Tension regulator adjustment

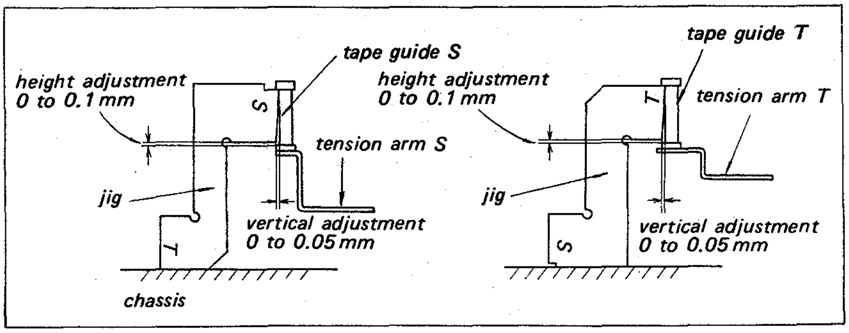

tape guide T
tape guide S
height adjustment 0 to 0.1 mm
height adjustment 0 to 0.1 mm
S
T
tension arm T
tension arm S
jig
jig
vertical adjustment 0 to 0.05 mm
vertical adjustment 0 to 0.05 mm
T
S
chassis

Fig. 5-19. Tension arm adjustment

Rewind Back Tension Adjustment

1. Remove the Counter Belt from the Counter Pulley.

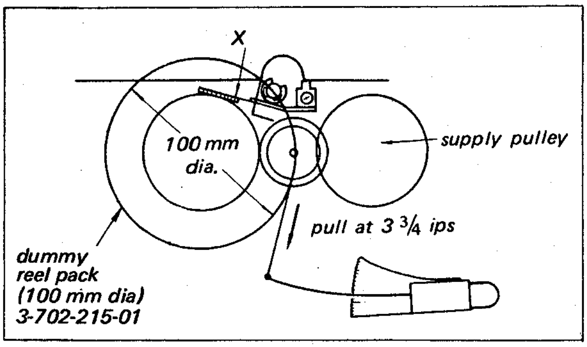

X
100 mm dia.
supply pulley
pull at 3 3/4 ips
dummy reel pack (100 mm dia) 3-702-215-01

Fig. 5-20. Rewind back tension check

2. Place a dummy reel pack (100 mm dia; Part No. 3-702-251-01) on the Take-Up Reel Table.
3. Press the REWIND button.
4. Using a spring scale at the tape end, pull the tape at approximately 3-3/4 inches per second.
5. The reading on the spring scale should be 8-10 grams. See Fig. 5-20.
6. Bend the REW Back Tension Bracket at X in Fig. 5-20 to secure the correct reading.
7. Check for clearance between the REW Back Tension Brake and the Take-Up Reel Table in the Stop mode.
8. Replace the counter belt.

Threading Back Tension

1. Place the Back Tension Adjustment Jig (Part No. VA-0058) over both Reel Tables and place a dummy reel pack (100 mm dia; Part No. 3-702-215-01) on the Supply Reel Table.
2. Remove the screws at the top edge of the C-R board and swing the top of the board out and down.

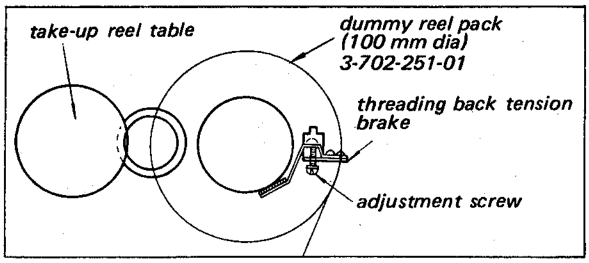

take-up reel table
dummy reel pack (100 mm dia) 3-702-251-01
threading back tension brake
adjustment screw

Fig. 5-21. Check for threading back tension

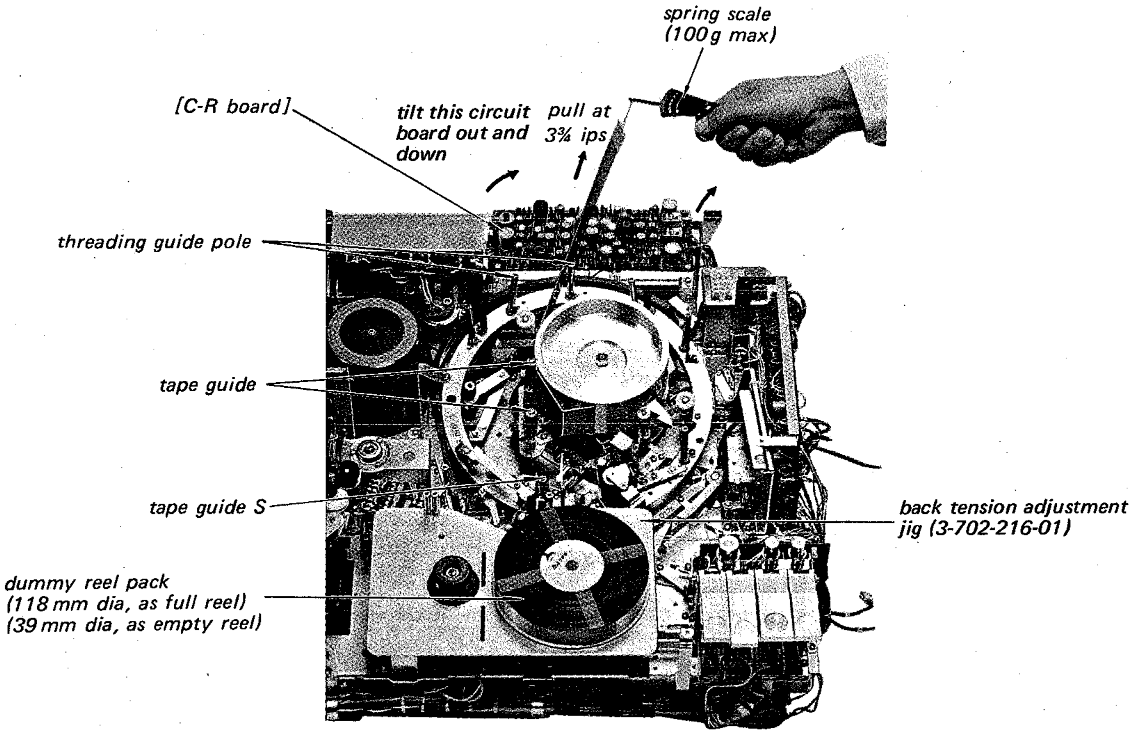

spring scale (100g max)
[C-R board]
tilt this circuit board out and down
pull at 3¾ ips
threading guide pole
tape guide
tape guide S
dummy reel pack (118 mm dia, as full reel) (39 mm dia, as empty reel)
back tension adjustment jig (3-702-216-01)

Fig. 5-22. Tension regulator back tension check setup

3. Press the FF button and measure threading back tension while pulling the tape end at $3^{3}/_{4}$ i.p.s. as shown in Fig. 5-22.
4. Adjust the screw on the Threading Back Tension Brake Assembly (See Fig. 5-21) for a reading of 8-9 grams. This screw is on the right-hand brake assembly beneath the Supply Reel Table.

Forward Back Tension Adjustment

Note: Place a black pen cap on the photo transistor.
Threading Back Tension should be set first.
Swing down the top edge of the C-R board for room to pull the tape.

1. Place the Back Tension Adjustment Jig (Part No. 3-702-216-01) on both Reel Tables and place a dummy reel pack (118 mm dia; Part No. 3-702-214-01) on the Supply Reel Table.
2. Set SKEW to mid range (pin opposite the mark on the cam). Press the PLAY button. Pull the tape end with a spring scale as shown in Fig. 5-22 at about 3-3/4 i.p.s. Pull the tape between the guide on the jig and the Tape Guide. Proper reading is 70–75 grams.
3. Bend the tang of the Skew Lever for the correct reading. See Fig. 5-23.
4. Stop the machine and place a dummy reel pack (39 mm dia; Part No. 3-702-213-01) on the Supply Reel Table and repeat Step 2. The tension reading should be 90 – 95 grams. If the reading is out of tolerance recheck with a 118 mm diameter reel pack.

CAUTION

Check to make sure that the Tension Arm does not obstruct illumination of the photo transistor at any setting of the SKEW control. (Auto Stop should be initiated if the black pen cap is removed from the photo transistor.)

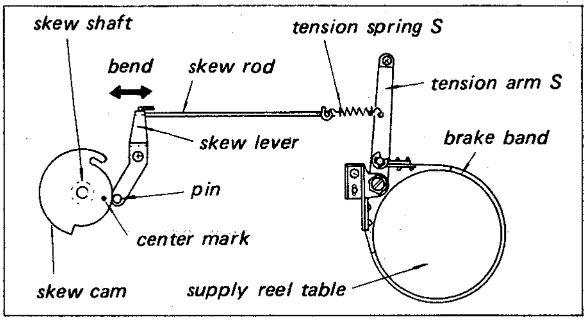

skew shaft
tension spring S
bend
skew rod
tension arm S
skew lever
brake band
C
pin
center mark
skew cam
supply reel table

Fig. 5-23. Setup for forward back tension check

5-16. FUNCTION BUTTON/RECORD-FUNCTION BUTTON ASSEMBLY REPLACEMENT AND ADJUSTMENT

Function Button Assembly Replacement

1. Unsolder nine leads on the Q board as shown in Fig. 5-24.
2. Remove the four PS 3x6 screws to remove the function button assembly together with record button assembly. See Fig. 5-25. Care should be taken when removing the function assembly, as the front horizontal members of the function button assembly are engaged with threading link lever and leaf spring tang of brake chassis as shown in Fig. 5-26.

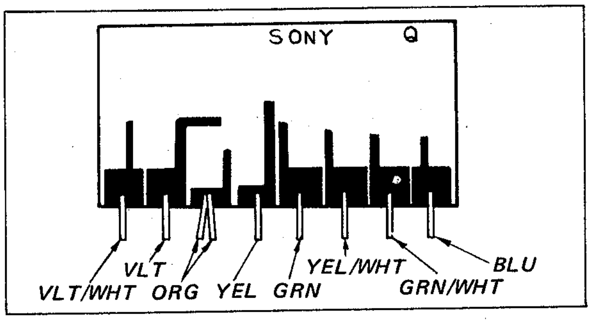

SONY
Q
VLT
YEL/WHT
BLU
VLT/WHT
ORG
YEL
GRN
GRN/WHT

Fig. 5-24. Wiring on Q board

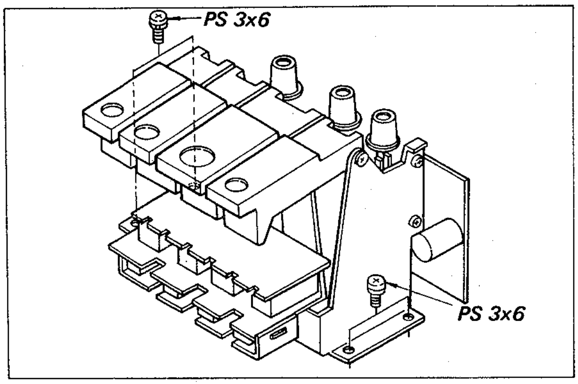

PS 3x6
PS 3x6

Fig. 5-25. Function button assembly removal

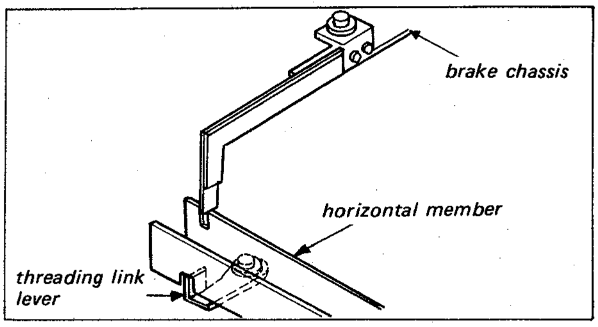

brake chassis
horizontal member
threading link lever

Fig. 5-26. Detail of linkage

3. Remove the four PS 3x5 securing the record function button assembly to the bracket of function button assembly as shown in Fig. 5-27.
4. Remove the lock arm plate on the slide plate of PLAY button (See Fig. 5-28), and then fix it to the new function button assembly.
5. Replace the record button assembly and the function button assembly by reversing the foregoing steps.
   After completing the replacement of function button or record function button assembly, check as follows:

Note: Make sure that threading link lever and leaf spring tang of brake chassis are in the notch on the front horizontal member of the function button assembly as shown in Fig. 5-26.
Place the lower tang of FF button lever in front of the fast forward lever as shown in Fig. 5-29.
Follow replacement check for proper latching action and operation of all function buttons as described later.

Record-Function Button Assembly Replacement

1. Remove the function button assembly together with record function button assembly as described in function button assembly replacement. See Fig. 5-25.

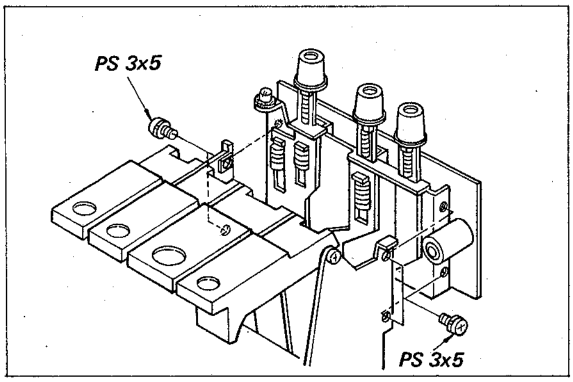


Fig. 5-27. Record-function button assembly removal

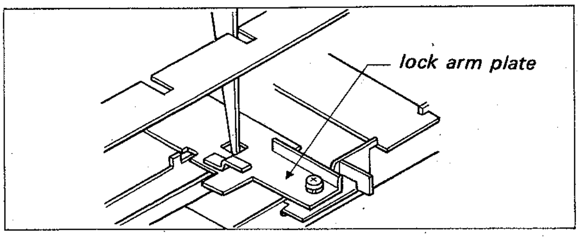


Fig. 5-28. Lock arm plate removal

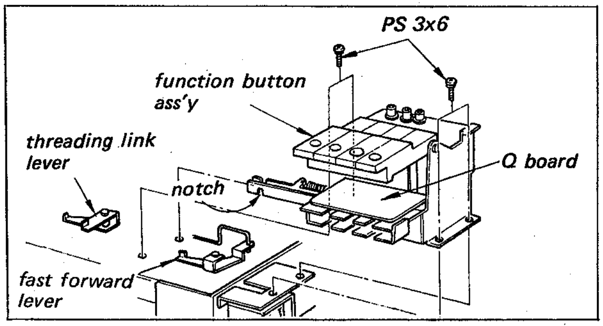


Fig. 5-29. Installation of the function button assembly

2. Remove the four PS 3x5 screws securing the record function button assembly to the function button assembly bracket as shown in Fig. 5-27. This frees record function button assembly.
3. Remove the three PS 3x5 screws securing R board to the record function button bracket, and then replace it to the new record function button assembly. See Fig. 5-27.
4. Replace the function button assembly and the record function button assembly by reversing the foregoing steps.

Function Button Operational Check and Adjustments

1. Press the F. FWD, PLAY, REWIND buttons and check for proper latching.
2. Check for 0.05 to 0.5 mm clearance between the Fast Forward Arm and the stopper on the Drive Wheel Lever in F. FWD mode. See Fig. 5-30.
3. Bend the end of the Fast Forward Lever at F to secure the correct clearance.
4. Stop the Take-Up Reel Table by hand and check that the Take-Up Reel Table slips at the limiter smoothly. If the Limiter does not work smoothly even if the correct clearance is obtained in Step 2, there is a lack of drive pressure. Check for possible causes of insufficient pressure. For example, the end of Solenoid Link Plate B might be striking the Bracket that supports the phototransistor (Refer to Fig. 5-38 for location of Solenoid Link Plate B.).
5. Check for 0.5 to 2.0 mm clearance between the circular drive belt and the Take-Up Reel Table. To correct this clearance, bend the vertical member of the FWD Release Lever to the left or right. See Fig. 5-30.

6. Press STOP and then REWIND buttons.
7. Stop the Supply Reel Table by hand and check to see that the limiter on the Supply-Reel Table works smoothly.
8. Check to see that in PLAY mode, RECORD and AUDIO DUB buttons cannot be depressed but only AUDIO DUB button is latched after depressing AUDIO SAFETY button.
9. In RECORD mode, check to see that SKEW control knob comes to its center position (neutral) automatically. See Fig. 5-31.

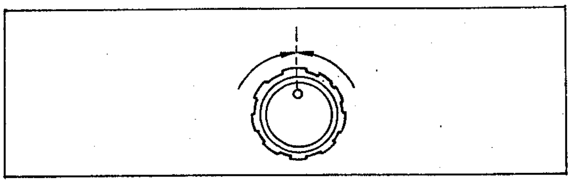


Fig. 5-31. Skew control knob operation

5-17. DC DRIVE MOTOR REPLACEMENT

1. Remove the two PS3x6 screws from the top and the three PS3x6 screws from the bottom that secure the F board ass'y and its shield cover and remove the modulator as shown in Fig. 5-33.
2. Unsolder the two leads from System Control on the M Board (mounted on the motor).
3. Remove the two PS3 x 6 screws that secure the motor assembly to the chassis. Remove the circular drive belt from the motor pulley.
4. Replace the motor by reversing the foregoing steps.

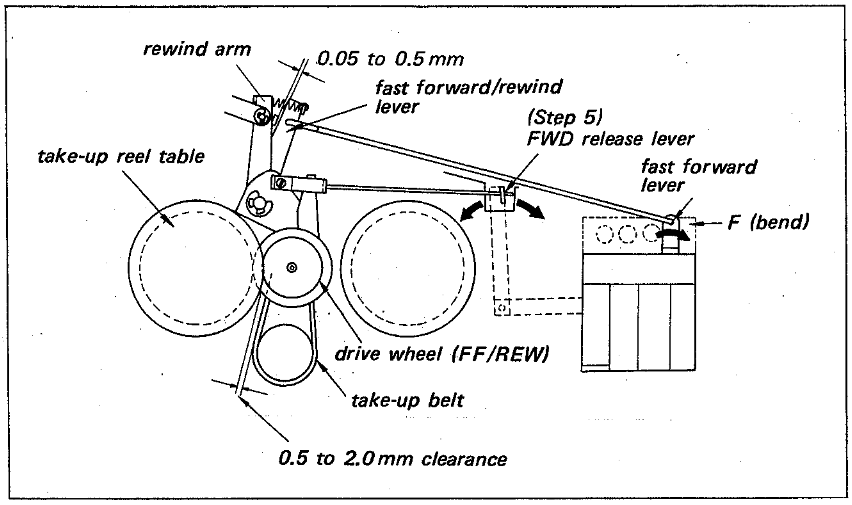

rewind arm
0.05 to 0.5 mm
fast forward/rewind lever
(Step 5) FWD release lever
take-up reel table
fast forward lever
F (bend)
drive wheel (FF/REW)
take-up belt
0.5 to 2.0 mm clearance

Fig. 5-30. Function button adjustment

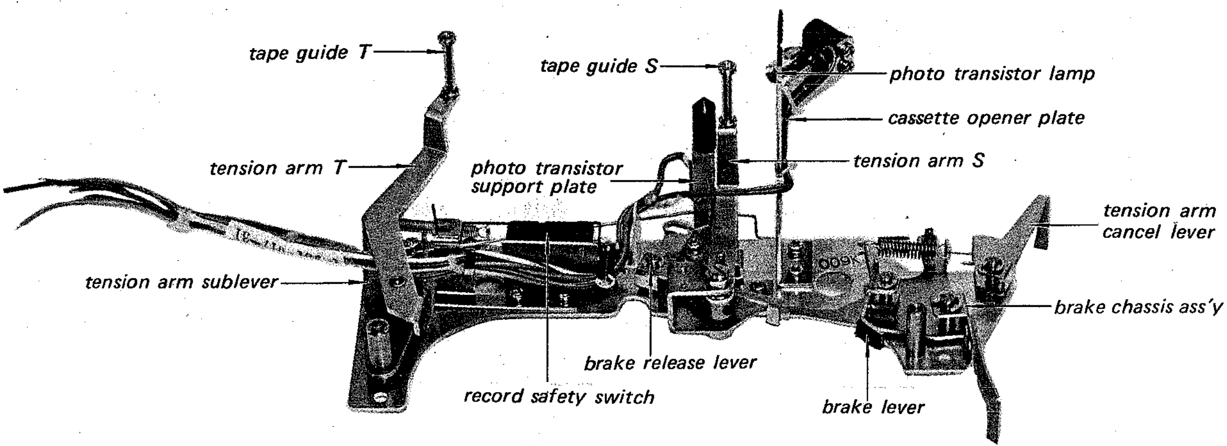

tape guide T
tape guide S
photo transistor lamp
cassette opener plate
tension arm T
photo transistor support plate
tension arm S
tension arm cancel lever
tension arm sublever
brake chassis ass'y
brake release lever
record safety switch
brake lever

Fig. 5-32. Subchassis removal

5-18. SUBCHASSIS (MECHANICAL) DISASSEMBLY

The subchassis is mounted just behind and below the Reel Tables.

1. Remove the two PS3 x 6 screws and lift off the Brake Band Stopper (semicircular aluminum ring surrounding the Supply Reel Table).
2. Unhook the spring on the Tension Arm S (Linked to the SKEW control). Be careful not to stretch the spring.
3. Remove the retaining washers (E washers) from both ends of the Threading Ring Lock Release Rod (long rod linked to Solenoid A). Be careful not to lose the E washers. Remove the rod.
4. Remove the five black screws that hold the Subchassis.
5. Release the lock on the Threading Ring and rotate the Threading Ring by hand to move the Threading Guide Roller away from the Subchassis.
6. Unsolder the leads to the photo transistor and lamp at the terminal strip mounted on the Solenoid B.
7. Rotate the Brake Plate counterclockwise (See Fig. 5-32). Lift off the Subchassis.
8. Reverse the above procedure to replace the Subchassis and make the following adjustments.

	SECTION
Tension Arm position and height	(5-15)
Tension Regulator	(5-15)
Brake	(5-14)
Function Button Latch	(5-16)

In addition, check for proper operation of the Auto Stop system.

5-19. THREADING RING REPLACEMENT

If the guides on the Threading Ring have been bent or misaligned so that tape runs off or fouls during the threading or unthreading operations, it might be necessary to replace the Threading Ring.

1. Retract the Threading Ring Drive Pulley Lever with your fingers or a retraction jig (3-702-222-01).
2. Release the lock on the Threading Ring and rotate the ring by hand until the hole marked with an X in Fig. 5-33 is in front of the capstan shaft. Do not push on the guides. Use the point of a Phillips head screwdriver in the hole in the ring.

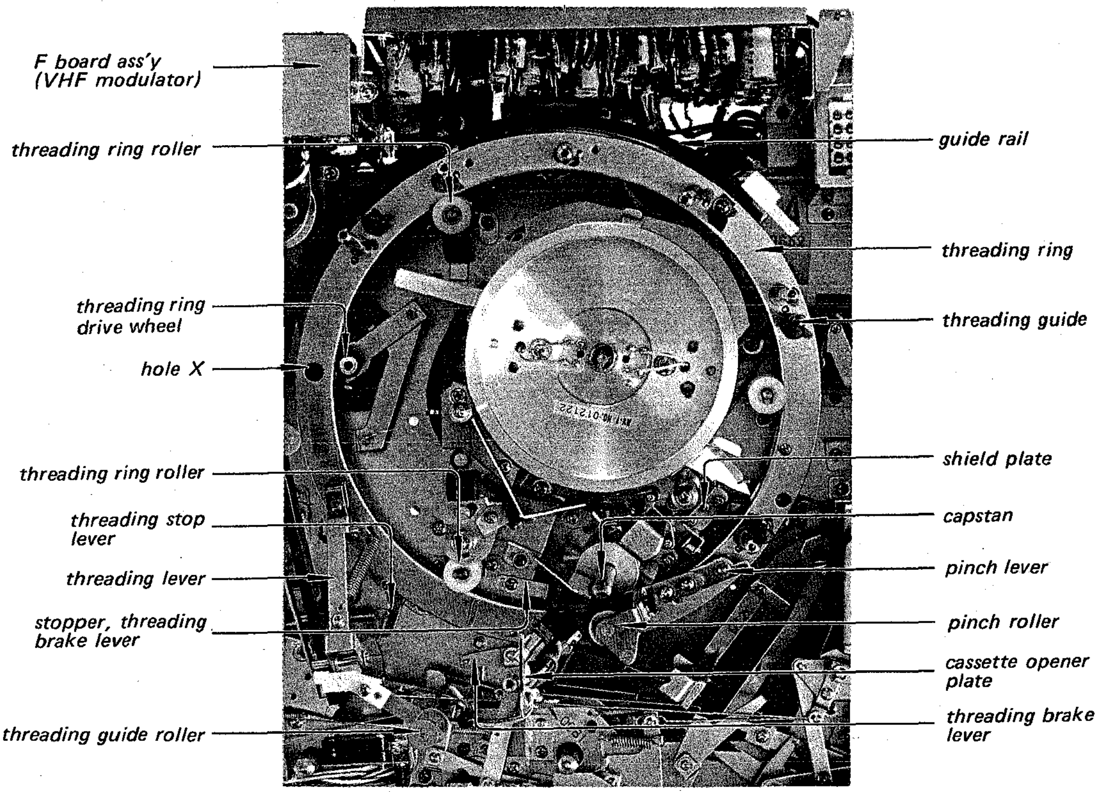

F board ass'y (VHF modulator)
threading ring roller
threading ring drive wheel
hole X
threading ring roller
threading stop lever
threading lever
stopper, threading brake lever
threading guide roller
guide rail
threading ring
threading guide
shield plate
capstan
pinch lever
pinch roller
cassette opener plate
threading brake lever

Fig. 5-33. Threading ring replacement

3. Remove the two screws that secure the rear Threading Ring Roller Bracket to the chassis.
4. Lift out and replace the Threading Ring by reversing this procedure. Be careful not to touch the Head-Drum Assembly.
5. Put a 0.2 mm shim between the Threading Ring and the rear ring roller. Tighten the mounting screws of the support bracket for this roller by holding the roller tight against the shim.
6. Check to see that the ring rotates freely after the shim has been removed.
7. Check for Threading Ring operation and proper operation of the three microswitches.

5-20. SOLENOID REPLACEMENT

Dust and dirt in the solenoid may impair its pulling power. In case of faulty operation, try removing and cleaning the plunger. If trouble persists replace the solenoid.

Solenoid A (FWD)

1. Remove the two P3 x 8 screws at the top edge of the B-R board and swing the board down.
2. Unsolder the leads at the terminals of the solenoid.
3. Remove the E washers shown in Fig. 5-34 and unhook springs A and B.
4. Back screw C all the way out to remove the Spring Adjustment Plate.
5. Remove the four PS 3x6 screws securing the solenoid bracket at the chassis and lift out the entire bracket-solenoid assembly.
6. Check the replacement solenoid for proper mechanical operation and install it by reversing the foregoing procedure.

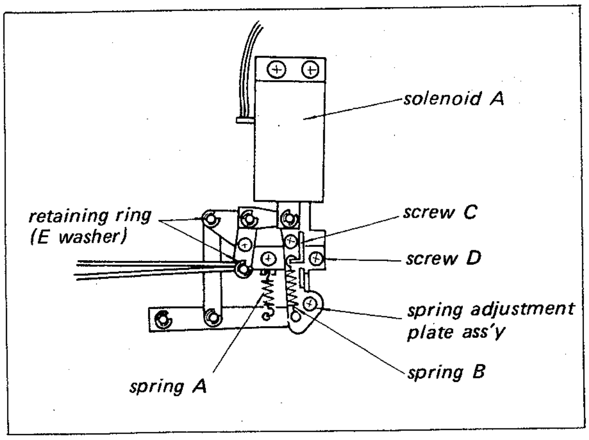


Fig. 5-34. Removal of solenoid A

The following checks must be made after the solenoid has been replaced.

7. Press the PLAY button.
8. Refer to Fig. 5-35. Loosen the solenoid mounting screws and position the solenoid carefully back and forth so that the tip of the Eccentric Roller Arm (2) is latched by the Eccentric Arm Lock Lever, and that the tip of the Eccentric Roller Arm (2) is within 0.5 mm of the line scribed on the lock lever.
   Confirm that mechanical shock does not release latching.

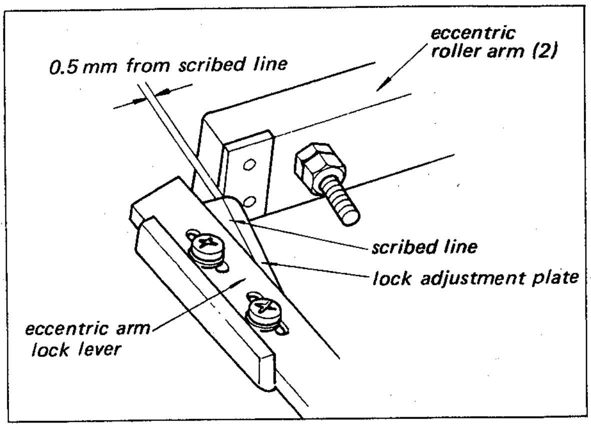


Fig. 5-35. Solenoid A adjustment

9. Refer to Fig. 5-36. Check the clearance between the post on the Eccentric Arm Lock Release lever and the hole in the Spring Adjustment Plate. The clearance should be 1.5 to 2.0 mm. Adjust the clearance by loosening the screw in the Spring Adjustment Plate.
10. Hold the Plunger of Solenoid A with your fingers, and then turn off the power switch. Confirm that mechanical lock is released when you frees the plunger.
11. Following Step 9, recheck Step 8 and make sure that the Pinch Roller Pressure Spring is operating (Eccentric Roller Arm (2) is clear of the double nuts by 0.5 to 1 mm.
12. Press the STOP button.
13. Refer to Fig. 5-37. Make sure that Eccentric Roller Arm (2) is stopped against the end of the Eccentric-Roller Arm Support Lever. The clearance between the Support Lever and the Lock Lever should be 0.2 to 1.0 mm.
    Adjust the position and angle of the Support Lever Stopper for the proper clearance.

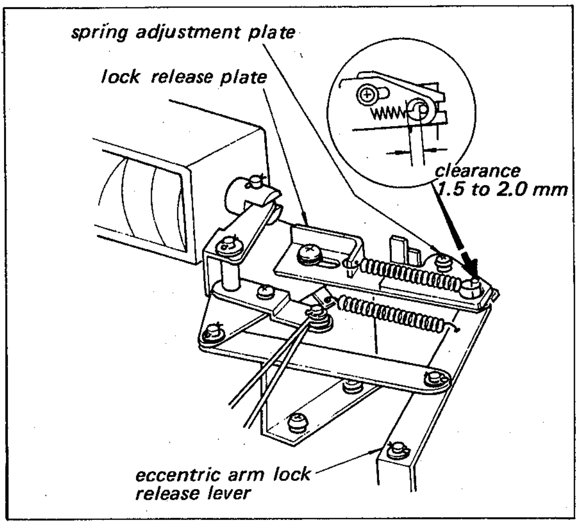

spring adjustment plate
lock release plate
clearance
1.5 to 2.0 mm
eccentric arm lock release lever

Fig. 5-36. Solenoid linkage adjustment

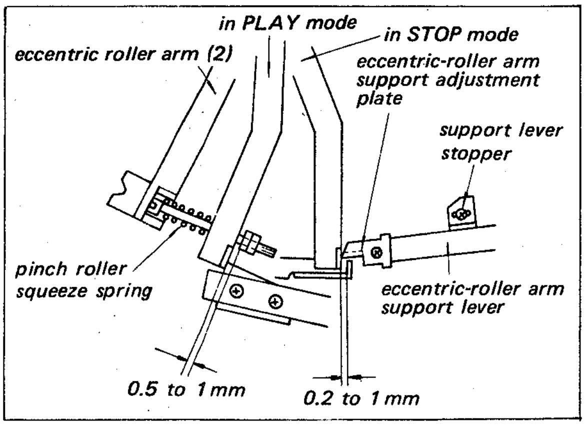

in PLAY mode
in STOP mode
eccentric roller arm (2)
eccentric-roller arm support adjustment plate
support lever stopper
pinch roller squeeze spring
eccentric-roller arm support lever
0.5 to 1 mm
0.2 to 1 mm

Fig. 5-37. Solenoid A linkage adjustment continued

14. Check to see that the brake is released on the Supply Reel Table in the Play Mode. See Fig. 5-38. The brake pad should clear the Supply Reel Table by 0.4 to 0.8 mm. To correct this reading, adjust the Solenoid Lever Adjustment Plate.
15. Check to see that the latch is released from the threading ring. If the latch does not release, bend the Lock Release Rod.
16. Check to see that the Function button latch mechanism works properly.
    Check to see that the part of the Brake Chassis Ass'y marked with an X in Fig. 5-38 is pulling the Function Button Lock Plate all the way to the left. If it does not, bend that part of the Brake Chassis Ass'y marked with an X.

Solenoid B (REW)

1. To remove the solenoid, unhook the spring to Tension Arm T and rotate the Tension Arm Support Plate counterclockwise as far as it will go. Refer to Fig. 5-39.
2. Unsolder the leads at the solenoid terminals.
3. Remove the two screws that hold down the U Board on Solenoid B. Swing the board out of the way.
4. Remove screw A, PS 3x6, in Solenoid Link Plate B and the retaining ring Ⓑ.
5. Unhook the Threading Lock Spring at the anchor under one of the solenoid mounting screws. See Fig. 5-39.

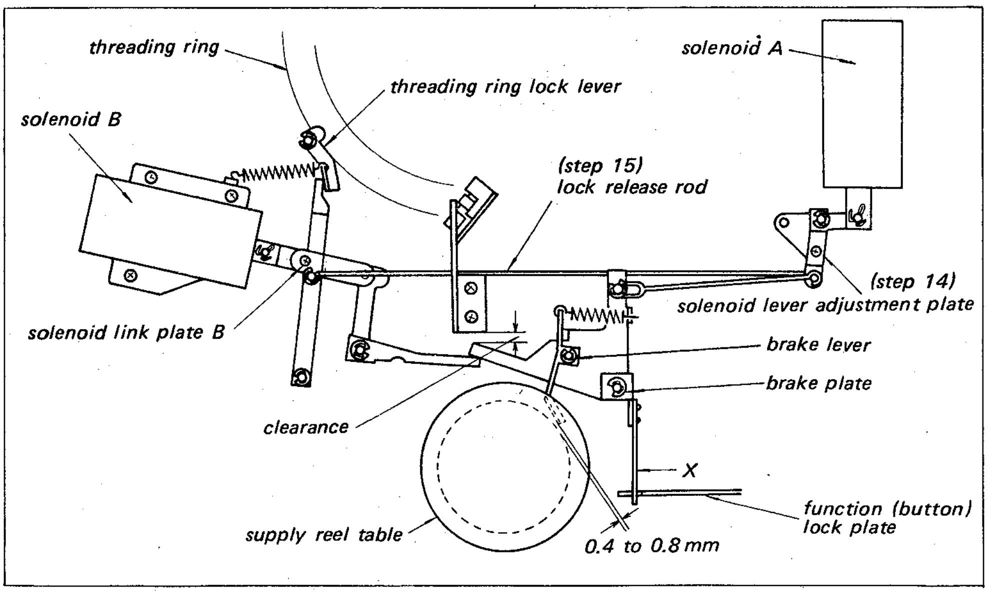

threading ring
threading ring lock lever
solenoid A
solenoid B
(step 15)
lock release rod
(step 14)
solenoid lever adjustment plate
solenoid link plate B
brake lever
brake plate
clearance
X
function (button) lock plate
supply reel table
0.4 to 0.8 mm

Fig. 5-38. Play mode solenoid linkage adjustment

6. Remove the three screws D that secure the solenoid to the chassis. Lift out the solenoid.
7. To replace the solenoid reverse the foregoing steps but leave the mounting screws loose for the following adjustments.
8. Tighten the screws temporarily so that the plunger operates in line with Solenoid Link Plate C. See Fig. 5-39.
9. Press the REWIND button.
10. Position the solenoid so that the clearance between the Rewind Arm and the Stopper on the Drive Wheel lever is 1.0 to 1.5 mm. See Fig. 5-40.
11. Check for clearance between the Take-Up Belt and the Take-Up Reel Table.
12. Adjust the position of Solenoid Link Plate B (Fig. 5-39) so that the clearance between the Brake Chassis Ass'y and the bottom of the Cassette Opener is the same as it is in the PLAY mode. Tighten the screw in Solenoid Link Plate B.
13. Check to see that the Drive Wheel (FF/REW) Assembly goes from the Supply Reel Table to the Take-Up Reel Table smoothly when going from REWIND to STOP. If not adjust the linkage between the solenoid and Link Plate B.

5-21. THREADING ADJUSTMENTS

Threading adjustments are required when the Threading Ring is replaced, or if the threading microswitches are replaced.

1. Place the Back Tension Jig (Part No. 3-702-216-01) over both Reel Tables. Check to see that the Threading Guide Roller is centered from side to side in the notch of the jig. If it is not, reposition the Guide Rail.
2. Rotate the Threading Ring by hand slowly to the stop position. Check to see that the Threading Guide Roller is within the dimensions (X) shown in Fig. 5-41.
3. If the Threading Guide Roller is not positioned as indicated in Step 2, loosen the screw in the Threading Ring Lock Lever Base. See Fig. 5-42. Bend the vertical tab on the Threading Switch Lever (marked XX in Fig. 5-42) to position the Threading Guide Roller properly. Check to make sure that the Front Horizontal Member is fully to the right in the Function Button Assembly when making this adjustment.
4. Reset the Threading Ring Lock Lever Base so that the roller is in the notch on the Threading Ring and tighten the screw.
5. Check for actuation of the end-of-unthreading microswitch S6011 when moving the Threading Ring to the stop position by hand.
6. If the switch does not operate properly, adjust the position of the micro switch or bend the actuator to provide 0 to 0.3 mm clearance at the gap marked A in Fig. 5-42.
7. Hold the Rubber Threading Drive Wheel away from the Threading Ring with your fingers and rotate the Threading Ring slowly by hand. Check the following.

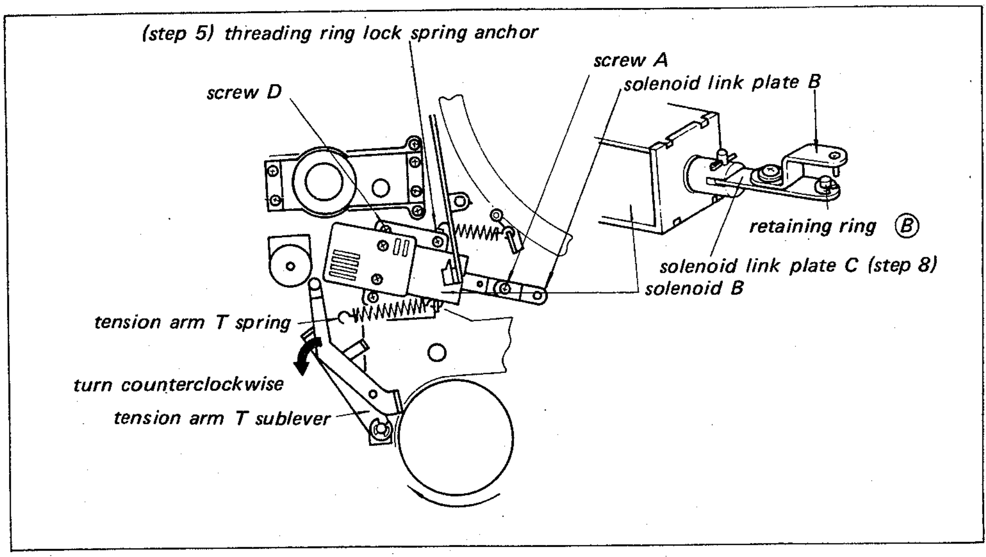


Fig. 5-39. Solenoid B removal

(a) The Threading Ring should turn smoothly.

(b) The Pinch Roller should not touch the Guide Rail.

(c) The Threading Lever should run smoothly on the Guide Rail.

(d) The ac motor turns on as the Pinch Roller passes the ac motor microswitch.

(e) The actuator for the ac motor switch does not touch the Threading Ring except for the cam mounted beneath the ring.

Reposition the rear threading roller bracket, the ac motor switch or the Guide Rail to correct any disagreement with the preceding.

8. Refer to Fig. 5-43. Rotate the Threading Ring to the fully threaded position and adjust the position of the Threading Stopper so that the pin beneath the Threading Ring runs fully off the cam of the Threading Brake Lever and check for separation between the Threading Brake Pad and the Supply Reel Table.

9. Check for actuation of the end-of-cycle microswitch S6010 when the Threading Ring is in the fully-threaded position. If not, reposition the microswitch or bend the actuator.

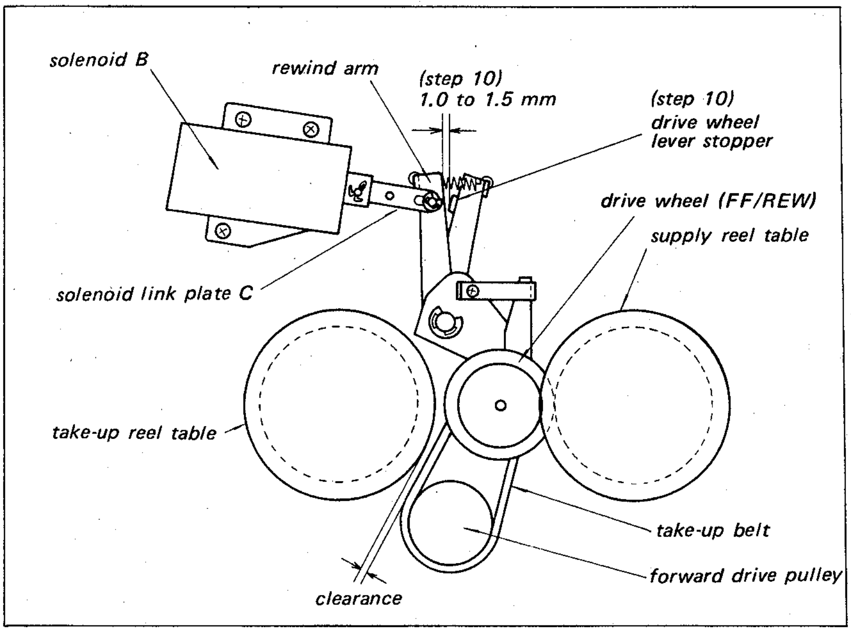

solenoid B
rewind arm
(step 10)
1.0 to 1.5 mm
(step 10)
drive wheel
lever stopper
drive wheel (FF/REW)
supply reel table
solenoid link plate C
take-up reel table
take-up belt
forward drive pulley
clearance

Fig. 5-40. Rewind solenoid adjustment

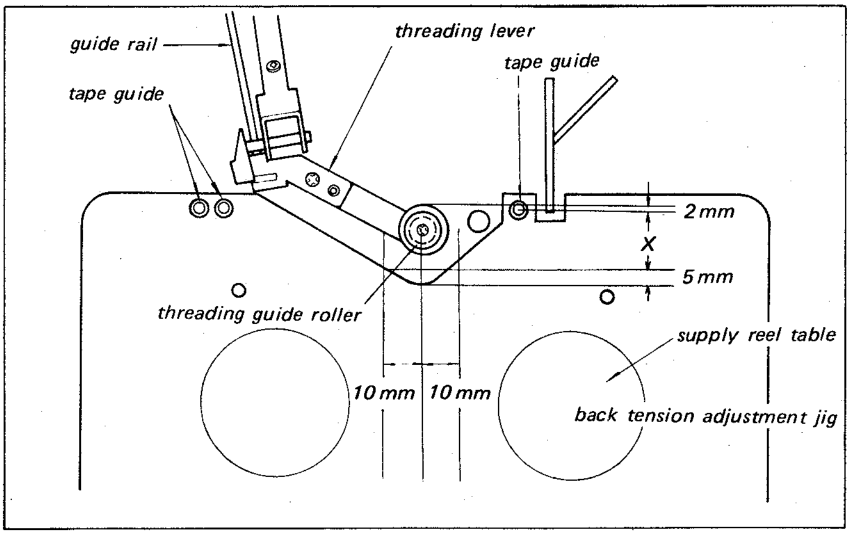

guide rail
tape guide
threading lever
tape guide
2mm
X
5mm
threading guide roller
supply reel table
10mm
10mm
back tension adjustment jig

Fig. 5-41. Adjustment of threading guide roller position

10. Check for 0 to 0.3 mm clearance between the Threading Switch Lock Lever and Eccentric Roller Arm 2. If necessary to correct, bend the Threading Switch Lock Lever at the point marked XXX in Fig. 5-43.

11. Bend the Eccentric Roller Brake Lever (marked XXXX) for a small amount of clearance between the Eccentric Roller Brake and the Eccentric Roller. See Fig. 5-43.

12. Check for proper position of the Pinch Roller when the threading cycle is complete. Refer to Section 5-9.

Threading Brake Adjustment

13. Return the Threading Ring to the STOP position.

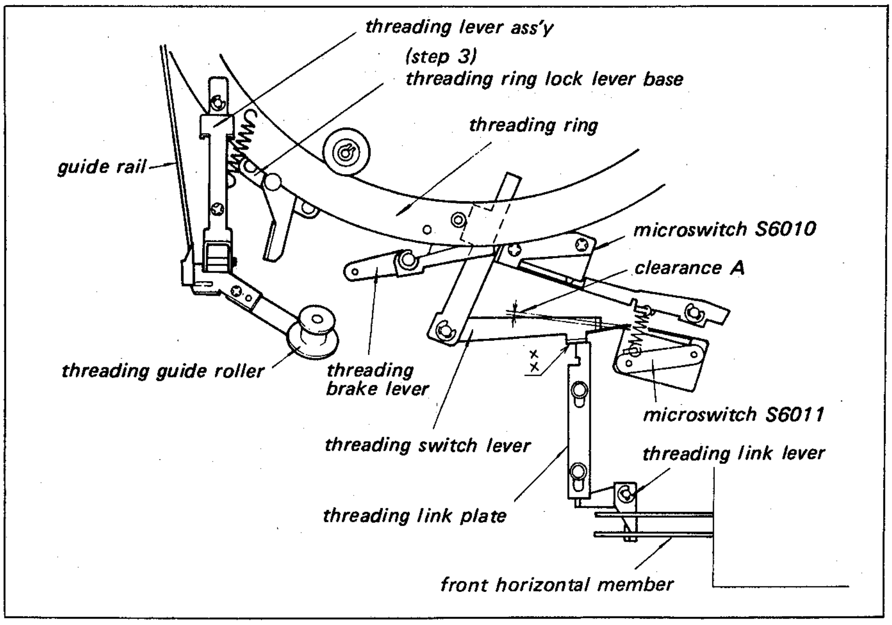

threading lever ass'y
(step 3)
threading ring lock lever base
threading ring
guide rail
microswitch S6010
clearance A
threading guide roller
threading brake lever
xx
microswitch S6011
threading switch lever
threading link lever
threading link plate
front horizontal member

Fig. 5-42. Threading adjustments

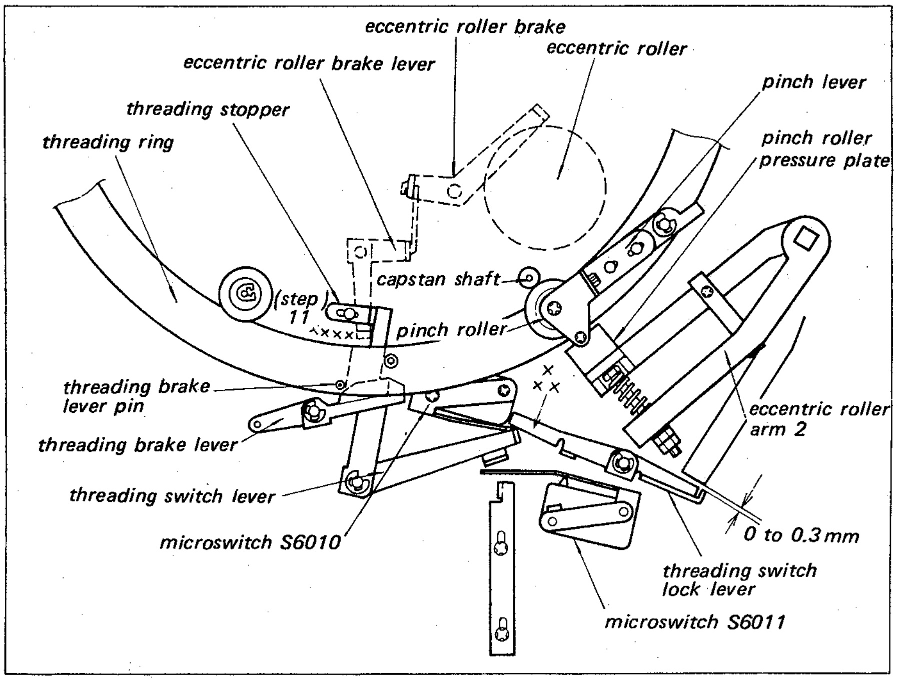

eccentric roller brake
eccentric roller
eccentric roller brake lever
pinch lever
threading stopper
threading ring
pinch roller pressure plate
capstan shaft
(step 11
xxxx
pinch roller
threading brake lever pin
xxx
threading brake lever
eccentric roller arm 2
threading switch lever
microswitch S6010
0 to 0.3mm
threading switch lock lever
microswitch S6011

Fig. 5-43. Threading adjustments at the fully threaded position

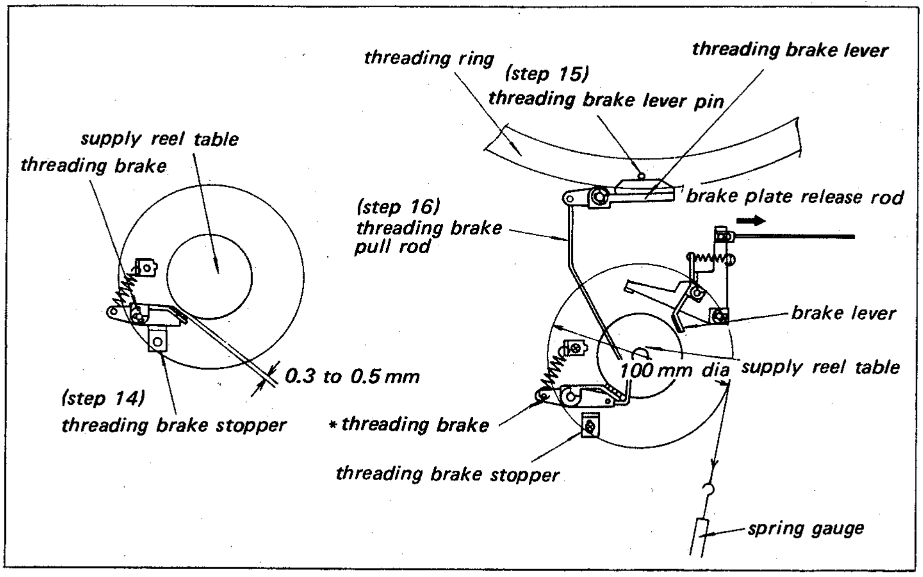

threading ring
(step 15)
threading brake lever pin
threading brake lever
supply reel table
threading brake
(step 16)
threading brake pull rod
brake plate release rod
brake lever
0.3 to 0.5 mm
100 mm dia
supply reel table
(step 14)
threading brake stopper
* threading brake
threading brake stopper
spring gauge

Fig. 5-44. Threading brake adjustments

14. Refer to Fig. 5-44. Check for 0.3 to 0.5 mm clearance between the Threading Brake and the Supply Reel Table. Adjust the Threading Brake Stopper if necessary.
15. Rotate the Threading Ring by hand until the pin beneath the ring (near the Threading Guide Roller in the fully threaded position) rides in the center of the cam on the Threading Brake Lever. See Fig. 5-44.
16. Place a dummy reel pack (100 mm dia; Part No. 3-702-215-01) on the Supply-Reel Table. Cancel the Brake Lever by hand and test the hold back of the Threading Brake. The reading should be 100 – 120 grams (400 to 600 gram-cm).
    If out of limits, remove the Supply Reel Table and bend the Threading Brake Pull Rod.

5-22. CAPSTAN SHAFT AND BEARING REPLACEMENT

1. Remove the diagonal chassis brace beneath the chassis.
2. Remove the PS3 x 6 screw that secures the Tape-Wind Preventer Plate. See Fig. 5-45.
3. Pull off the Bearing Cover Plate.
4. Loosen the two 4 x 4 set screws in the Flywheel and remove the Flywheel.
5. Loosen the two 3 x 3 set screws to remove the Sleeve that drives the Eccentric Roller. See Fig. 5-46.
6. Pull out the Capstan Shaft from the top and replace the shaft and/or bearing. See Fig. 5-47.
7. Install the Eccentric Roller Sleeve and set for minimum vertical play in the shaft.

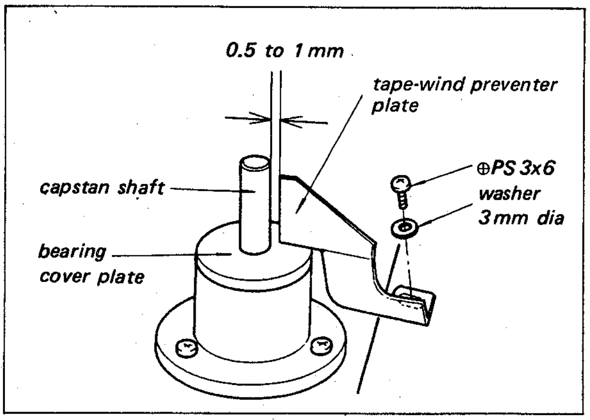

0.5 to 1 mm
tape-wind preventer plate
capstan shaft
⊕PS 3x6
washer
3 mm dia
bearing cover plate

Fig. 5-45. Capstan disassembly

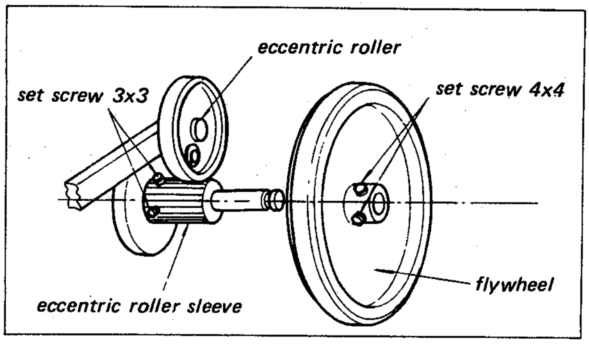

eccentric roller
set screw 3x3
set screw 4x4
flywheel
eccentric roller sleeve

Fig. 5-46. Flywheel/eccentric roller sleeve assembly

8. Install the Flywheel against the Eccentric Roller Sleeve.
9. Replace the Bearing Cover and the Tape-Wind Preventer Plate. Adjust for 0.5 to 1 mm clearance between the plate and the capstan.

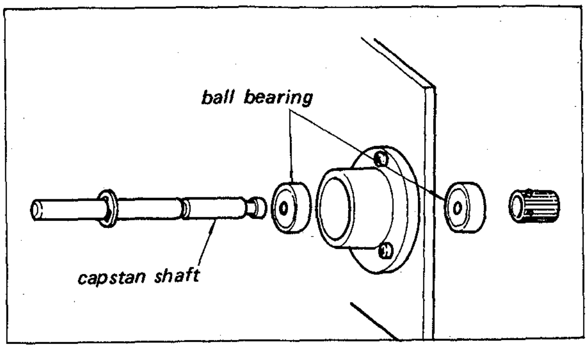

ball bearing
capstan shaft

Fig. 5-47. Capstan bearings

5-23. DRIVE BELT REPLACEMENT

There are ten rubber drive belts as follows:

	Name	Part No.	Width (mm)	Diameter (mm)
1.	Drum Belt	3-630-536-01	8	151.7
2.	Motor Belt	3-630-537-01	10	84.8
3.	Capstan Belt	3-630-545-01	12	175.7
4.	Drive Belt	3-630-538-01	4 (round)	183.0
5.	Take-Up Belt	3-630-501-01	3 (round)	375
6.	Threading belt 1	3-630-699-01	3 (round)	34.1
7.	Threading belt 2	3-630-458-02	3 (round)	55.1
8.	Counter Belt 1	3-630-580-01	1.6 (round)	56.7
9.	Counter Belt 2	3-630-581-01	1.6 (round)	107.8
10.	Counter Belt 3	3-630-582-01	1.6 (round)	36.0

Refer to Fig. 5-48.

1. Remove the diagonal chassis brace to replace the drive belts easily.
2. The Capstan Belt (on the flywheel) is mounted shiny-side-in.
3. All other flat belts are mounted shiny-side-out.
4. Clean the belts with methyl alcohol before installation.

5-24. RELAY PULLEY REPLACEMENT

1. Remove the Capstan and Motor Belts. See Fig. 5-49.
2. Remove the four 3 mm screws shown in Fig. 5-50 and remove the pulley assembly.
3. Replace the Relay Pulley Assembly and the drive belts. The shiny side of the Motor Belt is out; the shiny side of the Capstan Belt is in.

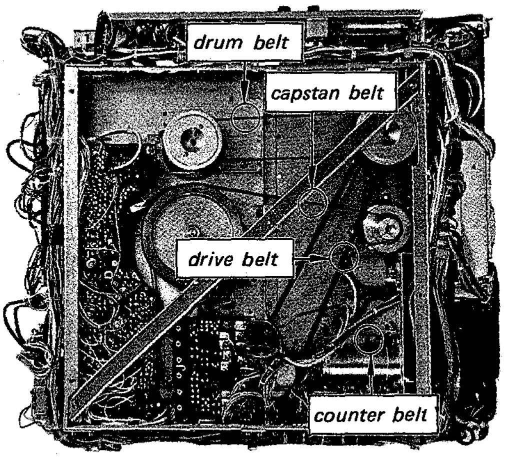

drum belt
capstan belt
drive belt
counter belt

Fig. 5-48. Drive belts

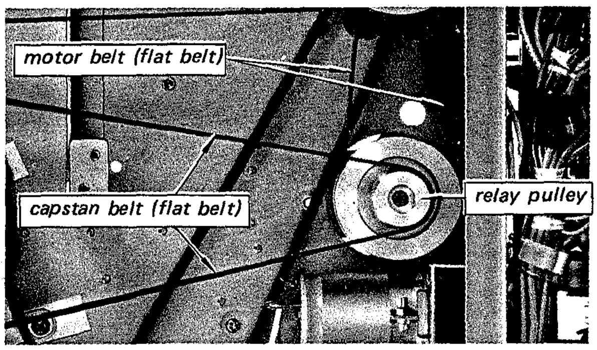

motor belt (flat belt)
capstan belt (flat belt)
relay pulley

Fig. 5-49. Relay pulley removal

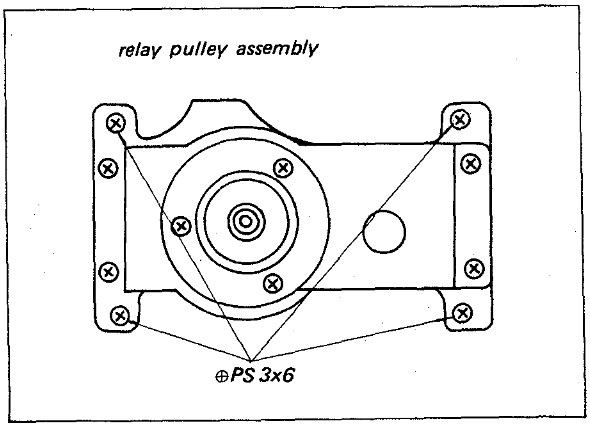

relay pulley assembly
⊕PS 3x6

Fig. 5-50. Relay pulley assembly mount

5-25. ECCENTRIC ROLLER REPLACEMENT

1. Remove the diagonal chassis brace beneath the chassis.
2. Loosen the two 4 x 4 mm set screws and remove the Flywheel.
3. Refer to Fig. 5-51. Pull off the E4 washer on the Eccentric Roller. Apply a drop of oil to the bearing before installing the new roller.

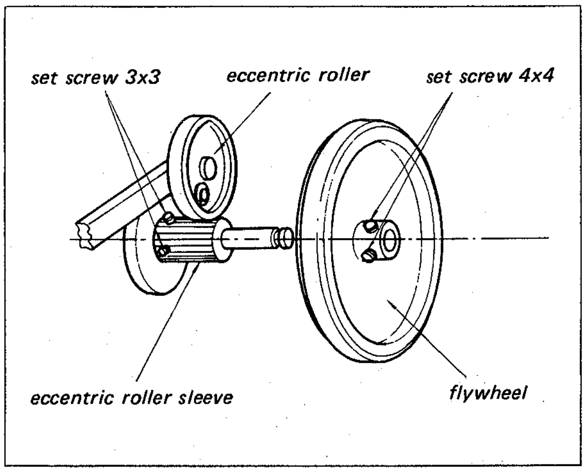

set screw 3x3
eccentric roller
set screw 4x4
eccentric roller sleeve
flywheel

Fig. 5-51. Eccentric roller replacement

SECTION 6
POWER SUPPLY ADJUSTMENT

Preliminary Check – Power line voltage should be 120V when making power supply adjustments.

Test Equipment Requirements – Dc Voltmeter, 1% accuracy

6-1. +24V REGULATOR ADJUSTMENT

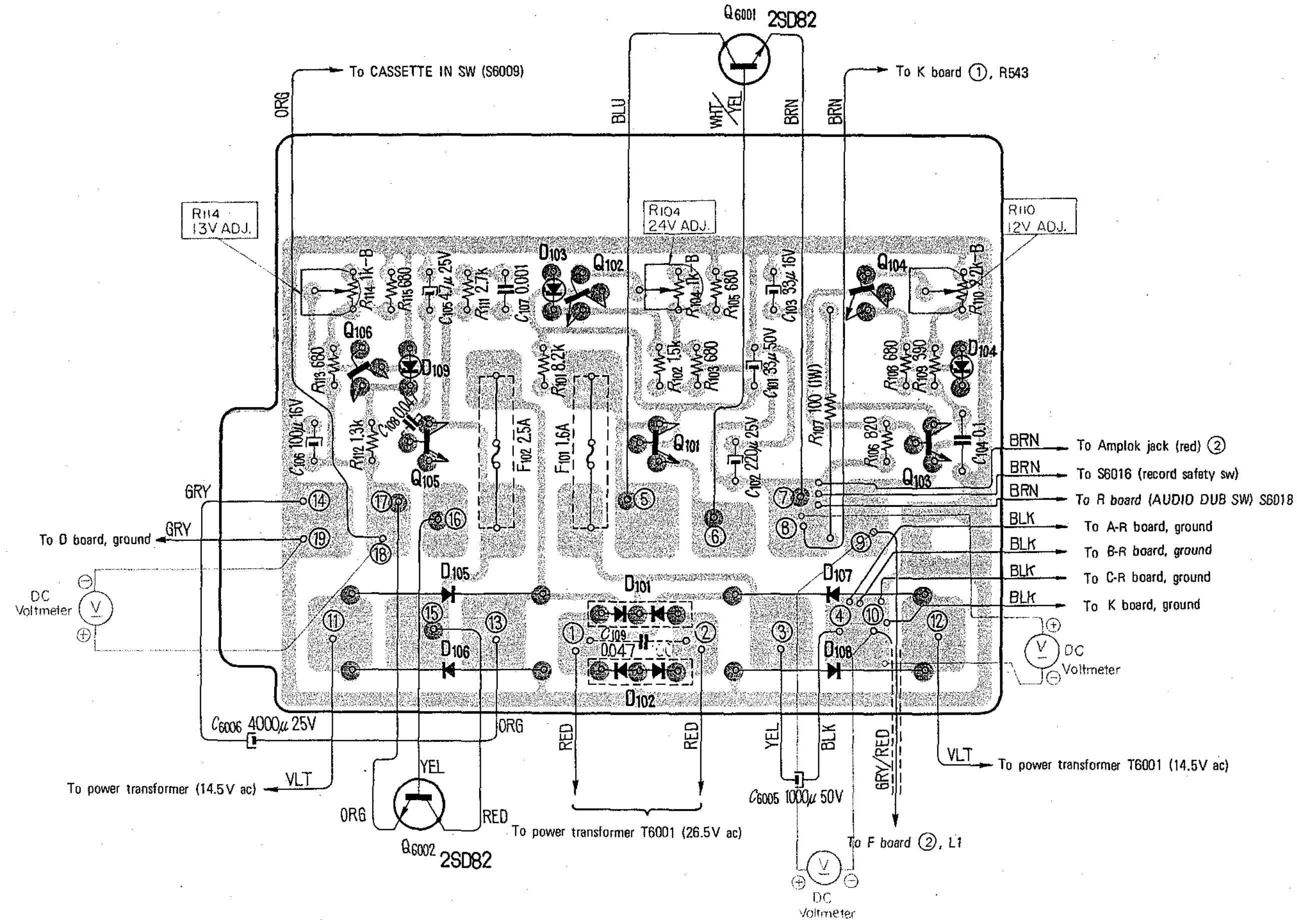
1. Connect the dc voltmeter between pin 8 (+) and pin 10 (–) of the J board.
2. Set R104 for a +24 volt reading.

6-2. +12V REGULATOR ADJUSTMENT

1. Connect the dc voltmeter between pin 9 (+) and pin 10 (–) of the J Board
2. Set R110 for a 12 volt reading.

6-3. +13V REGULATOR ADJUSTMENT

1. Connect the dc voltmeter between pin 18 (+) and pin 19 (–).
2. Set R114 for a +13 volt reading.


Q6001 2SD82
To CASSETTE IN SW (S6009)
To K board ①, R543
ORG
BLU
WHT/YEL
BRN
BRN
R114 13V ADJ.
R104 24V ADJ.
R110 12V ADJ.
D103
Q102
Q104
Q106
D109
D104
Q105
Q101
Q103
R114 1k-B
R115 680
C105 47μ 25V
R111 2.7k
C107 0.001
R104 1k-B
R105 680
C103 33μ 16V
R110 2.2k-B
R113 680
R101 8.2K
R102 1.5k
R103 680
C101 33μ 50V
R107 100 (1W)
R108 680
R109 390
C106 100μ 16V
R112 1.3k
C108 0.047
F102 2.5A
F101 1.6A
C102 220μ 25V
R106 820
C104 0.1
BRN
To Amplok jack (red) ②
BRN
To S6016 (record safety sw)
BRN
To R board (AUDIO DUB SW) S6018
BLK
To A-R board, ground
BLK
To B-R board, ground
BLK
To C-R board, ground
BLK
To K board, ground
GRY
GRY
To D board, ground
DC Voltmeter
D105
D106
D101
D102
D107
D108
C109 0.047
C6006 4000μ 25V
ORG
RED
RED
YEL
BLK
GRY/RED
VLT
To power transformer T6001 (14.5V ac)
To power transformer (14.5V ac)
VLT
YEL
ORG
RED
Q6002 2SD82
To power transformer T6001 (26.5V ac)
C6005 1000μ 50V
To F board ②, L1
DC Voltmeter
DC Voltmeter
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲

SECTION 7
SERVO SYSTEM ALIGNMENT

Test Equipment Requirements

a. Color TV Monitor

b. Oscilloscope – Tektronix 561 or equivalent.

c. Frequency Counter – Hewlett Packard HP-5245L or equivalent

d. Sony VIDEOCASSETTE ALIGNMENT TAPE

Adjustment Sequence - Adjustments should be made in the sequence given in the following procedures:

7-1. HEAD DRUM FREE-RUNNING SPEED CHECK

1. Disable the photo transistor by placing an opaque paper or plastic cap over the phototransistor assembly (a black pen cap is satisfactory).
2. Disable the Cassette Load switch S6009 by shorting its terminal lugs.
3. Connect a counter or oscilloscope to TP-3 or TP-6 on the B-R (Servo) board. See Fig. 7-1.
4. Depress the PLAY button and wait for completion of the threading cycle.
5. Check for a free-running speed of 30.38 to 30.45 rps (Hz). This corresponds to a period of 32.84 to 32.92 milliseconds.

If a period counter is not available, a rough check of free-running speed may be made as follows:

Connect the scope probe to TP-11 on the B-R (Servo) board. Set up the conditions of Steps 1~4. Sync the scope from the power line. Pulses will move from right to left across the trace. Using a stop watch or a watch with a sweep second hand, time the interval it takes for ten pulses to pass some selected reference mark on the scope graticule. This interval should be between 11 and 14 seconds.

If free-running speed is out of specification, check to see if the problem is electrical or mechanical as follows:

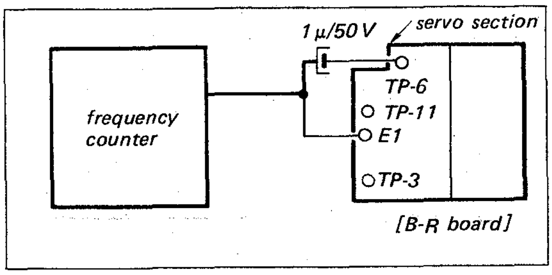


Fig. 7-1. Head drum free-running speed check test setup

Unsolder the violet lead from the brake coil at terminal 25 on the B-R (Servo) board. If this restores correct free-running speed, the servo circuits are malfunctioning.

Troubleshoot the brake coil drive circuits. If free-running speed remains incorrect, check the rubber belts for excessive wear, grease or oil. Clean and replace the head drum drive belt.

7-2. RAMP SLOPE ADJUSTMENT

1. Connect the scope to TP-9 on the B-R (Servo) board. See Fig. 7-2. Set scope sensitivity to 1 V/cm; time base to 2 msec/cm.
2. Playback the Sony VIDEOCASSETTE ALIGNMENT tape stairstep segment and adjust the scope controls to center the negative-going ramp on the waveform.
3. Adjust R37 for a slope of 0.5 V per msec (5 volts in 10 msec). Refer to Fig. 7-3.

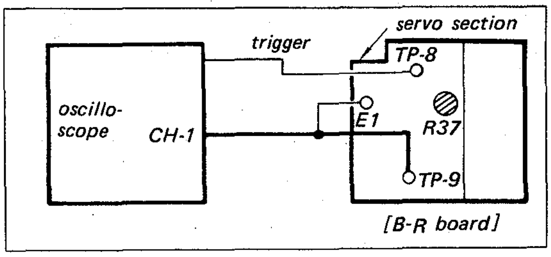


Fig. 7-2. Ramp slope adjustment test setup

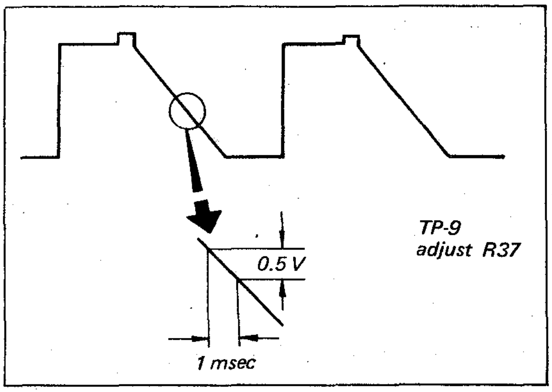


Fig. 7-3. Ramp slope adjustment

7-3. PHASE LOCK ADJUSTMENT

1. Apply a stairstep signal at 1V (p-p) to the VIDEO IN jack.
2. Connect the CH-2 probe of a dual trace scope to TP-6 on the B-R board. See Fig. 7-4.

3. Connect the CH-2 probe to TP-526 on the A-R board.
4. Trigger the scope from TP-5 on the B-R board.
5. Set up the record mode. Remember to disable the Record Safety Switch S6016 by taping down the actuator wire.
6. Observe the waveform as shown in Fig. 7-5 and adjust R34 on the B-R board for a 6.5H interval between the trailing edge of the waveform at TP-6 and the leading edge of vertical sync at TP-526.

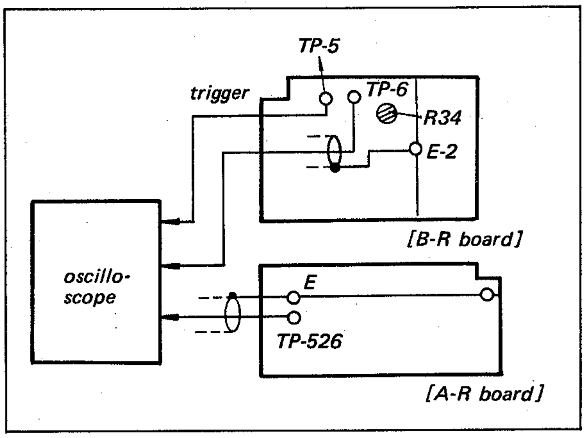

TP-5
trigger
TP-6
R34
E-2
[B-R board]
oscillo-scope
E
TP-526
[A-R board]

Fig. 7-4. Phase lock adjustment test setup

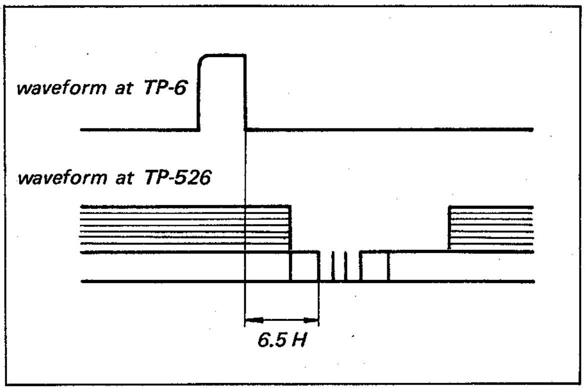

waveform at TP-6
waveform at TP-526
6.5 H

Fig. 7-5. Phase lock adjustment

7-4. TRACKING CONTROL RANGE

1. Connect the CH-1 probe of the scope to TP-4 of the B-R (Servo) board. See Fig. 7-6. Set CH-1 gain to 5 V/cm, time base to 5 msec/cm. Set sync selector to sync on CH-1 only.
2. Connect the CH-2 probe to TP-2 of the B-R (Servo) board. See Fig. 7-6. Set CH-2 gain to 5 V/cm.
3. Set R17 to mid range.
4. Set the TRACKING control fully clockwise.
5. Playback the Sony ALIGNMENT tape.
6. Adjust R20 for a 22 msec positive pulse duration for the waveform at TP-4 (CH-1). See Fig. 7-7.
7. Set the TRACKING control fully counterclockwise.
8. Adjust R17 for 8 msec between the trailing edge (negative-going) of the signal at TP-4 and the leading edge of the CTL signal at TP-2. See Fig. 7-8.
9. Turn TRACKING control fully clockwise. Trailing edge of signal at TP-4 should lag the leading edge of the CTL pulse by 8 msec. See Fig. 7-9.
10. Touch up R17 for an 8 msec lead at minimum setting of the TRACKING control. Touch up R20 for an 8 msec lag at maximum setting of the TRACKING control.

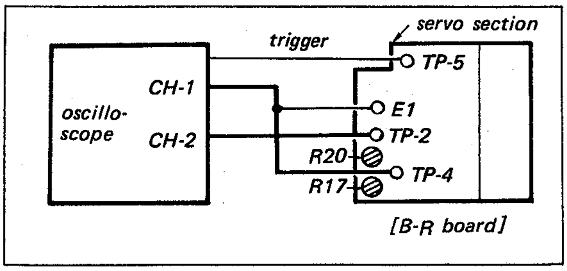

servo section
trigger
TP-5
CH-1
oscillo-scope
CH-2
E1
TP-2
R20
R17
TP-4
[B-R board]

Fig. 7-6. Tracking control range adjustment test setup

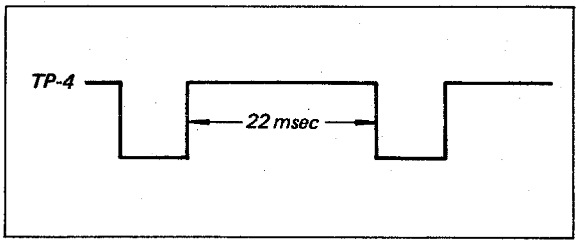


Fig. 7-7. Preliminary tracking adjustment

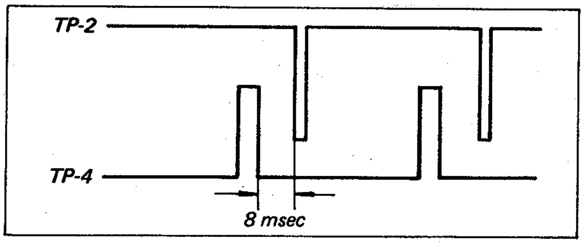

TP-2
TP-4
8 msec

Fig. 7-8. Second tracking range adjustment (Tracking control fully counterclockwise)

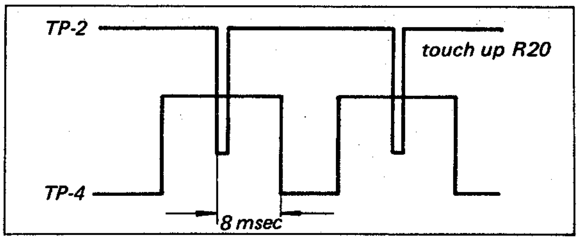

TP-2
touch up R20
TP-4
8 msec

Fig. 7-9. Tracking control range final check (Tracking control fully clockwise)

7-5. VIDEO HEAD SWITCHING POSITION

1. Connect the CH-2 probe of the scope to TP-527 (video output) of the A-R board. See Fig. 7-10. (Set CH-2 sensitivity to 0.5 V/cm.)
2. Connect the CH-1 probe to TP-6 of the B-R (Servo) board (See Fig. 7-10). Set sensitivity to 2 V/cm. Sync on CH-1 only, time base at 100 μsec.
3. Playback the stairstep segment of the ALIGNMENT tape.

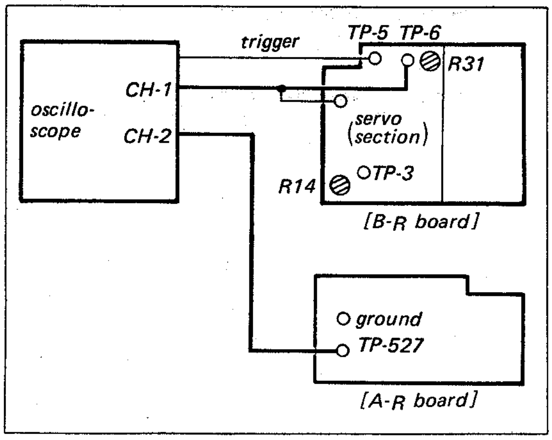

trigger
TP-5 TP-6
R31
CH-1
oscillo-scope
CH-2
servo section
R14
TP-3
[B-R board]
ground
TP-527
[A-R board]

Fig. 7-10. Video head switching position adjustment test setup

4. Trigger on the positive-going (leading) edge of the 30 PG pulse (CH-1). Set scope to CHOP and observe the vertical sync interval.
5. Adjust R31 so that the negative-going (trailing) edge of the delayed 30 PG (A) pulse is 6.5 H (412.8 μsec) ahead of vertical sync. See Fig. 7-11.
6. Transfer CH-2 probe to TP-3 on the B-R (Servo) board.
7. Set R14 so that the negative-going (trailing) edge of the 30 PG (B) pulse is 6.5 H ahead of vertical sync. See Fig. 7-11.

7-6. DROPOUT COMPENSATOR BLANKING PULSE WIDTH

1. Connect the scope probe to TP-11 on the B-R (Servo) board. See Fig. 7-12. Set sensitivity to 1 V/cm, time base at 500 μsec/cm.
2. Playback the stairstep segment of the ALIGNMENT tape.
3. Trigger on the leading (positive-going) edge of the waveform.
4. Adjust R58 for 2 msec pulse width (duration of positive-pulse). See Fig. 7-13.

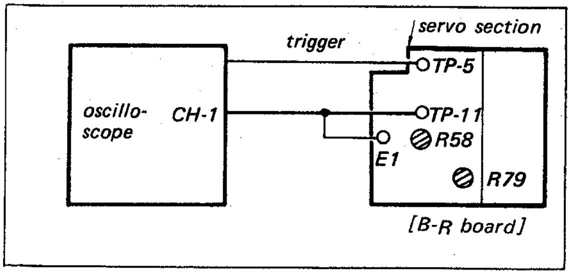

servo section
trigger
TP-5
oscillo-scope
CH-1
TP-11
R58
E1
R79
[B-R board]

Fig. 7-12. Dropout compensator blanking pulse width adjustment test setup

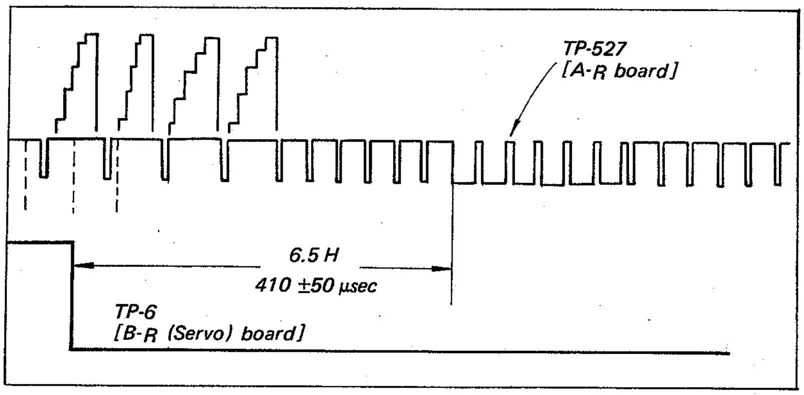

TP-527
[A-R board]
6.5 H
410 ±50 μsec
TP-6
[B-R (Servo) board]

Fig. 7-11. Video head switching position

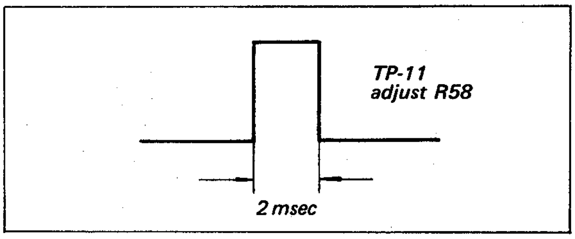

TP-11
adjust R58
2 msec

Fig. 7-13. Dropout compensator blanking pulse width

7-7. MUTING TIME

1. Place the ALIGNMENT tape in the cassette compartment.
2. Press the PLAY button.
3. Adjust R79 at B-R board (See Fig. 7-12) so that the picture appears 1.8 to 2.2 seconds after completion of the threading cycle.

7-8. RECORD MUTING TIME

1. Apply a stairstep signal at 1V (p-p) to the VIDEO IN jack.
2. Connect the scope to TP-16 on the G board. See Fig. 7-14.
3. Set up the record mode. (Be sure that the Record Safety Switch (S6016) is closed by taping down the actuator wire.) Time the interval between the instant the STAND BY lamp goes out and r-f appears at TP-16. See Fig. 7-14.
4. Adjust R80 for a 2 second interval for the conditions observed in Step 3.

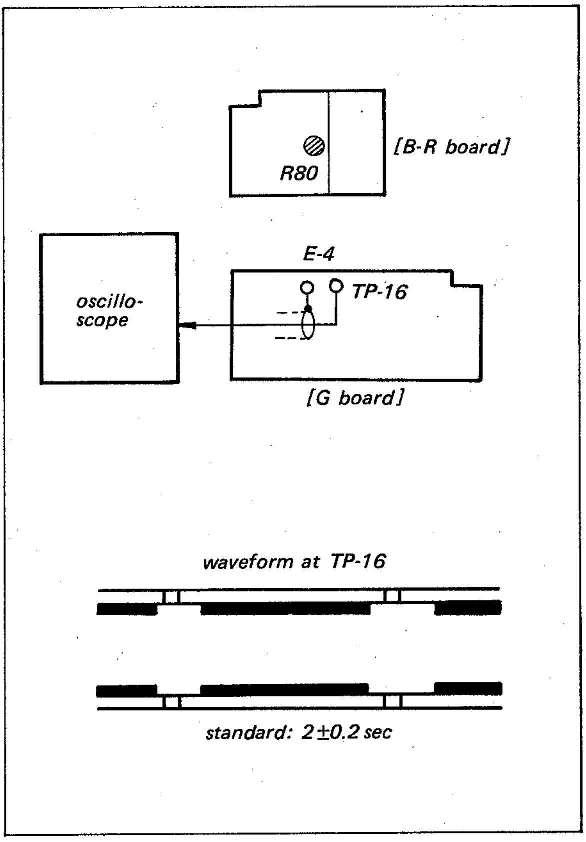

[B-R board]
R80
E-4
oscillo-scope
TP-16
[G board]
waveform at TP-16
standard: 2±0.2 sec

Fig. 7-14. Record muting interval

SECTION 8
VIDEO SYSTEM ALIGNMENT

Test Equipment Requirements

- a. Color TV Monitor
- b. Oscilloscope – Tektronix 561 or equivalent
- c. Frequency Counter – Hewlett Packard HP-5245L or equivalent
- d. Sony VIDEOCASSETTE ALIGNMENT TAPE
- e. Dc Voltmeter

Adjustment Sequence – Adjustments should be made in the sequence given in the following procedures. Playback adjustments are made first, followed by record adjustments.

(Playback Adjustments)

8-1. VIDEO HEAD RESONANCE AND DAMPING

1. Connect the scope to TP-401 on the B-R (R-F) board. See Fig. 8-1.
2. Trigger the scope from TP-6 on the B-R (Servo) board.
3. Playback the rf sweep segment of the Sony VIDEOCASSETTE ALIGNMENT tape.
4. Adjust C403 and R401 for a flat response between 3.58 and 5.4 MHz. See Fig. 8-2.
5. Connect the scope to TP-403 on the B-R (R-F) board. See Fig. 8-1.
6. Trigger the scope from TP-3 on the B-R (Servo) board.
7. Playback the rf sweep segment of the Sony VIDEOCASSETTE ALIGNMENT tape.
8. Adjust C411 and R416 for flat response between 3.58 and 5.4 MHz. See Fig. 8-2.

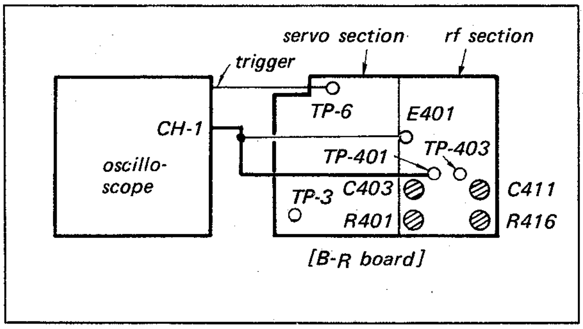

servo section
rf section
trigger
CH-1
oscillo-scope
TP-6
E401
TP-401
TP-403
TP-3
C403
C411
R401
R416
[B-R board]

Fig. 8-1. Video head resonance and damping adjustment test setup

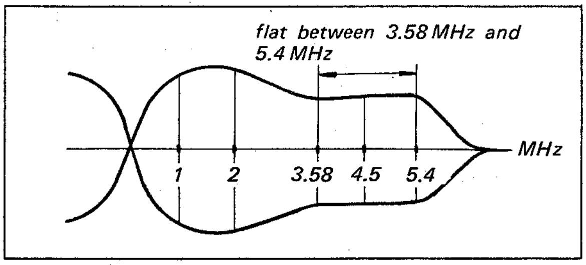


Fig. 8-2. Head response and damping

8-2. PLAYBACK EQUALIZATION

1. Connect the scope to TP-402 on the B-R (R-F) board. See Fig. 8-3.
2. Trigger the scope from TP-6 on the B-R (Servo) board.
3. Playback the rf sweep segment of the ALIGNMENT tape.
4. Adjust L401 and R411 for the response shown in Fig. 8-4.
5. Connect the scope to TP-404 on the B-R (R-F) board. See Fig. 8-3.
6. Trigger the scope from TP-3 on the B-R (Servo) board.
7. Adjust L402 and R426 for the response shown in Fig. 8-4.

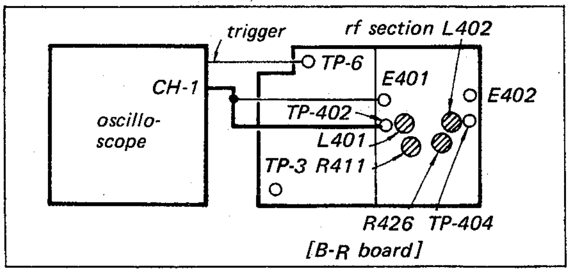

trigger
rf section
L402
TP-6
E401
CH-1
E402
oscillo-scope
TP-402
L401
TP-3
R411
R426
TP-404
[B-R board]

Fig. 8-3. Playback equalization adjustment test setup

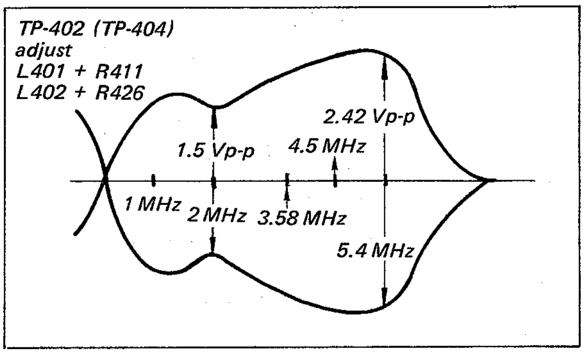


Fig. 8-4. Playback equalization

8-3. Y CHANNEL BALANCE

1. Connect the scope to TP-406 on the B-R (R-F) board. See Fig. 8-5.
2. Trigger the scope from TP-3 or TP-6 on the B-R (Servo) board.
3. Playback the stairstep segment of the ALIGNMENT tape.
4. Adjust R431 for equal amplitude envelopes on alternate fields. Refer to Fig. 8-6.

8-4. Y PB OUTPUT

1. Connect the scope to TP-406 on the B-R (R-F) board. See Fig. 8-5.
2. Trigger the scope from TP-3 or TP-6 on the B-R (Servo) board.
3. Playback the stairstep segment of the ALIGNMENT tape.
4. Adjust R445 for a reading of 0.2V (p-p). See Fig. 8-5.

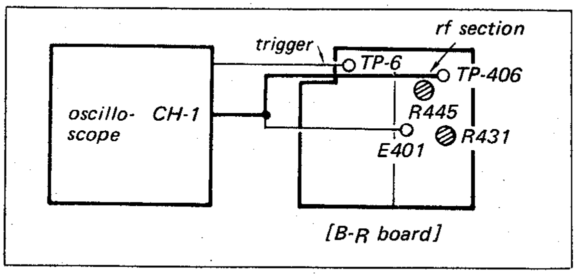

rf section
trigger
TP-6
TP-406
R445
R431
E401
oscillo- scope
CH-1
[B-R board]

Fig. 8-5. Y pb output test setup

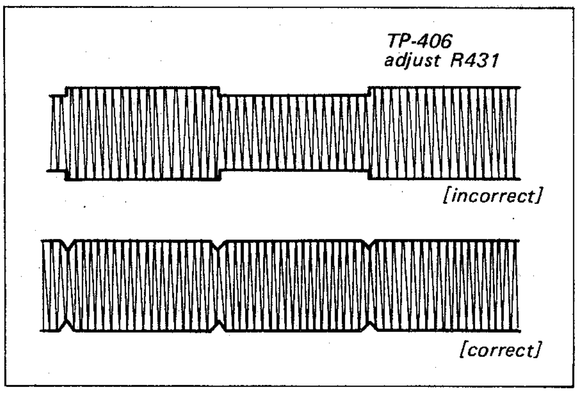

TP-406
adjust R431
[incorrect]
[correct]

Fig. 8-6. Y-channel balance

8-5. DROPOUT COMPENSATOR SENSITIVITY

Note: Adjustment of the dropout compensator is normally made using a jig to provide simulated dropout of known amplitude and duration. Adjustments given herein are field adjustments to be performed only if components have been replaced on the K Board. If results are not satisfactory, the K Board should be replaced.

1. Turn R520 fully counterclockwise (K board).
2. Playback a section of tape known to have noticeable dropout (usually the beginning of a much-used tape). Dropouts will appear as long black dashes followed by white transients.
3. Turn R520 clockwise slowly and stop at the point where dropouts disappear. Recheck earlier section of the tape where dropouts had been visible.

8-6. DROPOUT COMPENSATOR BALANCE

1. Playback the section of tape known to have dropouts.
2. Turn R542 (K board) fully counterclockwise and then clockwise until streaks disappear.

8-7. CARRIER BALANCE 1 AND 2

1. Connect the scope to TP-527 on the A-R board. See Fig. 8-7.
2. Playback the stairstep segment of the ALIGNMENT tape.
3. Sync the scope to observe one horizontal line.
4. Adjust R667 and R678 for minimum beat at all levels of the signal. See Fig. 8-8.

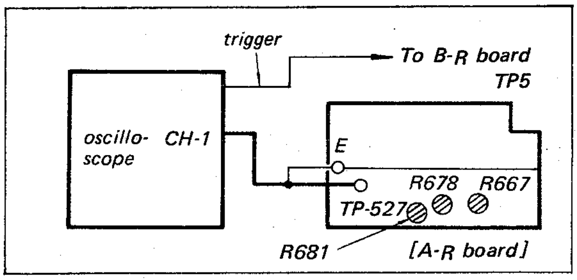

trigger
To B-R board TP5
oscillo- scope
CH-1
E
R678
R667
TP-527
R681
[A-R board]

Fig. 8-7. Carrier balance adjustment test setup

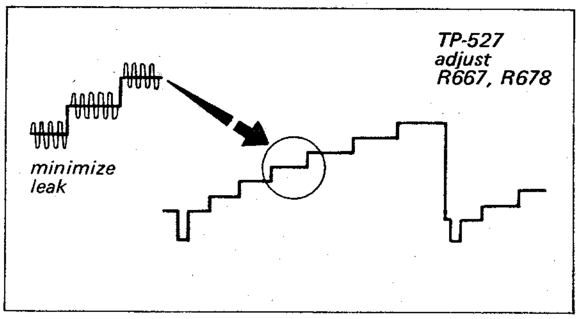

TP-527
adjust
R667, R678
minimize
leak

Fig. 8-8. Carrier balance

8-8. Y LEVEL ADJUSTMENT

1. Terminate the VIDEO OUT connector with 75 ohms.
2. Connect the scope to TP-527 on the A-R board.
3. Adjust R681 (See Fig. 8-7) for 1V (p-p).

8-9 3.58 MHz OSCILLATOR FREQUENCY ADJUSTMENT

1. Connect a frequency counter having a high input impedance to TP-511 on the A-R board. See Fig. 8-9.
2. Allow 15 minutes for warm-up of all equipment.
3. Set C553 for a counter reading of 3579545 ± 5 Hz.
4. Disconnect the counter.
5. Check output level at TP-511 with a scope. It should be 5.5 ± 1.0 V(p-p).

8-10. COLOR BALANCE

1. Connect the scope to TP-506 on the A-R board. See Fig. 8-10.
2. Sync scope from the AC line; time base at 5 msec/cm.
3. Playback the color bar segment of the ALIGNMENT tape.

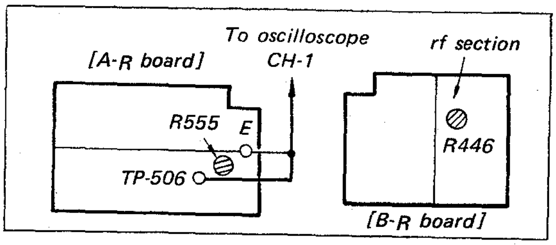

To oscilloscope CH-1
[A-R board]
rf section
R555
E
TP-506
R446
[B-R board]

Fig. 8-10. Color balance adjustment test setup

4. Adjust R446 on the B-R (R-F) board for equal envelope output on alternate fields.

8-11. 688 kHz COLOR LEVEL

1. Connect the scope to TP-506 on the A-R board. See Fig. 8-11.
2. Playback the color bar segment of the ALIGNMENT tape.
3. Set R555 for a reading of 0.47 V (p-p).
4. Transfer the scope probe to TP-508.
5. Adjust R566 for a reading of 1.0 to 1.2 V (p-p).

8-12. COLOR AGC BLANKING

1. Connect the scope to TP-507 on the A-R board. See Fig. 8-12.
2. Sync the scope from the power line.
3. Playback the color bar segment of the ALIGNMENT tape.

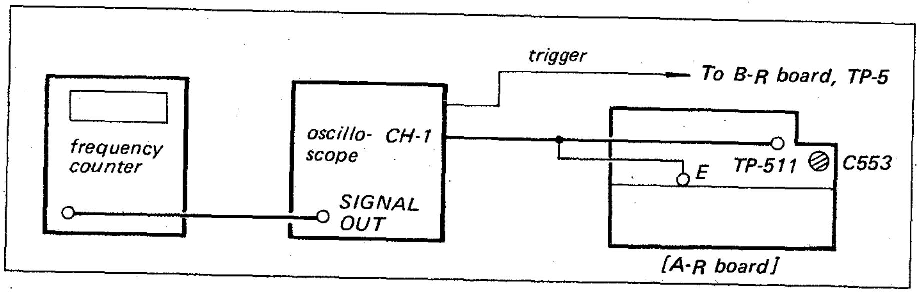

trigger
To B-R board, TP-5
frequency counter
oscillo-scope
CH-1
SIGNAL OUT
E
TP-511
C553
[A-R board]

Fig. 8-9. 3.58 MHz oscillator frequency adjustment

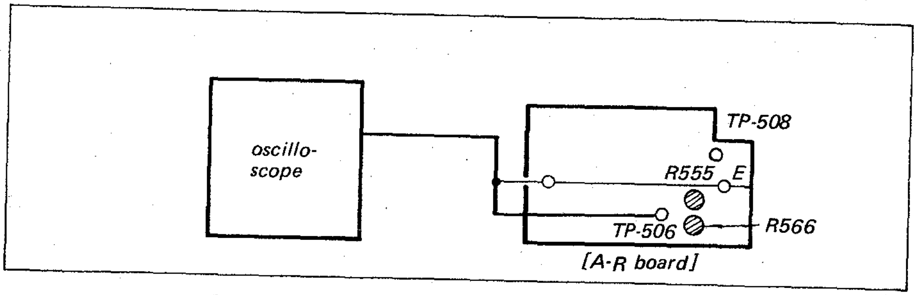

oscillo-scope
TP-508
R555
E
TP-506
R566
[A-R board]

Fig 8-11. 688 kHz color level adjustment test setup

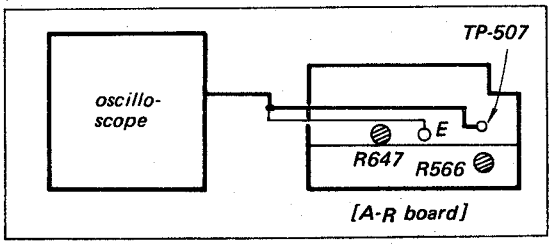

TP-507
oscillo-
scope
E
R647
R566
[A-R board]

Fig. 8-12. Color AGC blanking adjustment test setup

4. Adjust R647 so that there is minimum difference in signal level between the vertical sync interval and the remainder of the waveform (continuous dc level). See Fig. 8-13.

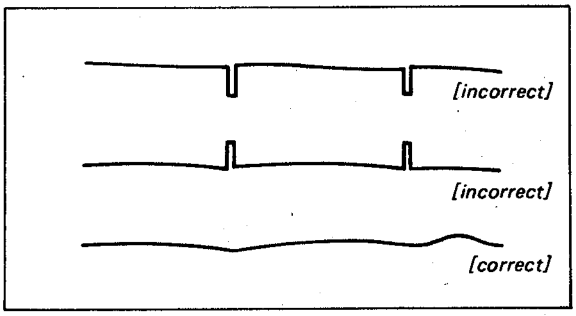

[incorrect]
[incorrect]
[correct]

Fig. 8-13. Color AGC blanking

8-13. COLOR APC ADJUSTMENTS

1. Connect the scope to TP-514 on the A-R board. See Fig. 8-14.
2. Playback the color bar segment of the Alignment Tape.
3. Adjust the core of T503 for best burst shape. See Fig. 8-15.
4. Stop the tape.
5. Ground TP-532 with a 0.1μF capacitor. See Fig. 8-16.
6. Connect the scope or a dc voltmeter to TP-529 on the A-R board. See Fig. 8-16.
7. Adjust R725 for a reading of 1.5 volts dc.
8. Connect a frequency counter to TP-530. See Fig. 8-17.
9. Adjust L512 for a reading of 688,374±300 Hz.
10. Remove the capacitor installed in Step 5 and connect the scope to TP-532.
11. Adjust L513, L514 and L515 for maximum amplitude.
12. Connect the scope to TP-528. See Fig. 8-18.
13. Adjust R612 for 2V(p-p).
14. Ground TP-532 with a 0.1μF capacitor. See Fig. 8-16.
15. Connect the scope to TP-529.
16. Playback the color-bar segment of the Alignment Tape.
17. Adjust R726 for 1.5 volts dc.
18. Remove the capacitor installed in Step 14.

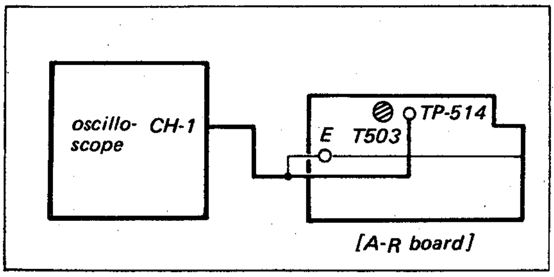

oscillo-
scope
CH-1
TP-514
E
T503
[A-R board]

Fig. 8-14. Color APC adjustment test setup (1)

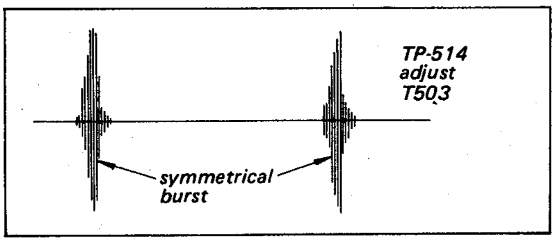

TP-514
adjust
T503
symmetrical
burst

Fig. 8-15. Color APC

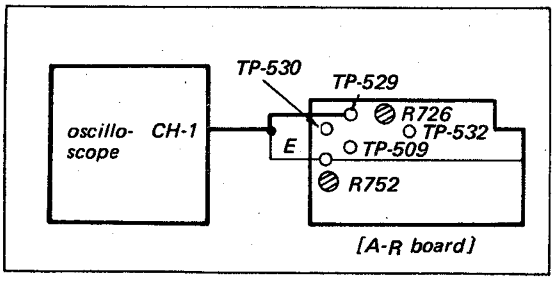

oscillo-
scope
CH-1
TP-530
TP-529
R726
TP-532
E
TP-509
R752
[A-R board]

Fig. 8-16. Color APC adjustment test setup (2)

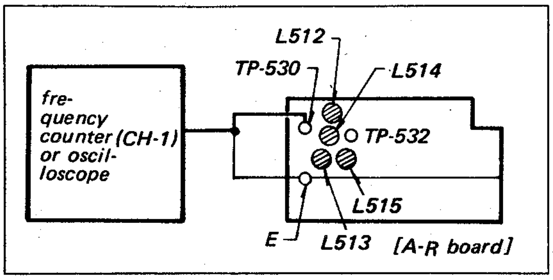

fre-
quency
counter (CH-1)
or oscil-
loscope
L512
TP-530
L514
TP-532
L515
E
L513
[A-R board]

Fig. 8-17. Color APC adjustment test setup (3)

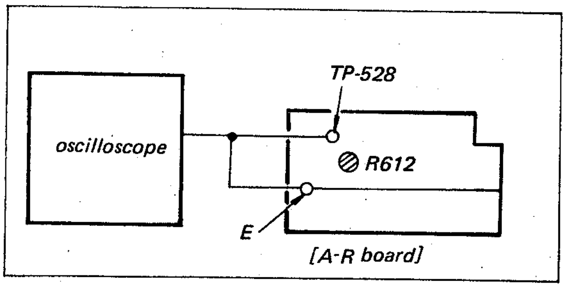


Fig. 8-18. Color APC adjustment test setup (3)

8-14. Y MIX LEVEL

1. Terminate the VIDEO OUT connector with 75 ohms.
2. Connect the scope probe to TP-527 on the A-R board. See Fig. 8-19.
3. Playback the color bar segment of the ALIGNMENT tape.
4. Adjust R708 for 1 V (p-p) (peak white).

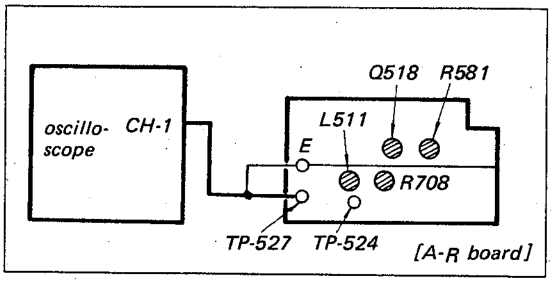


Fig. 8-19. Y mix level, 3.58MHz trap and color mix adjustment test setup

8-15. 3.58 MHz TRAP

1. Place scope probe at TP-524 as shown in Fig. 8-19.
2. Playback the color bar segment of the ALIGNMENT tape.
3. Adjust L511 for minimum 3.58MHz in the color bar sections of the waveform.

8-16. COLOR MIX ADJUSTMENT

1. Repeat Steps 1 and 2 of Section 8-14.
2. Playback the color bar segment of the ALIGNMENT tape.
3. Adjust R581 for a burst signal of 0.3 V (p-p) See Fig. 8-19.

Record Circuit Adjustment

Note: 1. The following adjustments are made with the machine in the E-to-E and record modes. If these modes are set up without a cassette in the holder, disable the Record Safety switch S6016 by taping down the actuator wire.
2. Adjustments should be made with a standard video input signal 1V (p-p), 0.7V white and 0.3V sync, applied at the VIDEO IN jack. Set the INPUT SIGNAL SELECTOR to EXTERNAL.
3. All of the following adjustments are on the G board unless otherwise noted.

8-17. VERTICAL DRIVE LEVEL CHECK

There are no adjustments in this procedure. It is included to make sure that the servo board is supplied with the correct vertical drive signal.

1. Connect the scope probe to TP-2 on the G board. See Fig. 8-20.
2. Apply a 1V (p-p) stairstep signal to the VIDEO IN jack.
3. Set up the E-to-E mode by depressing the RECORD button.
4. The waveform at TP-2 should appear as shown in Fig. 8-20, 17±2V (p-p).

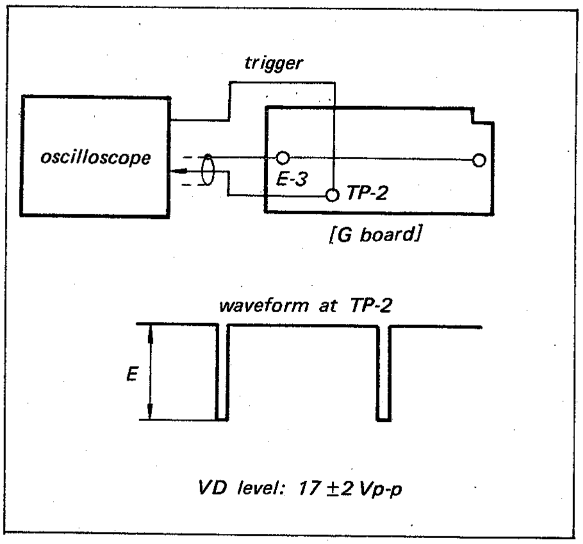


Fig. 8-20. Check of servo reference signal in record mode

8-18. LUMINANCE AGC LEVEL

1. Connect the scope probe to TP-3 on the G board. Trigger the scope from TP-2 or use interval sync. See Fig. 8-21.
2. Set up the E-to-E mode by depressing the RECORD button. Input signal - 1V (p-p) stairstep.
3. Adjust R36 for a level at TP-3 to 1.0V (p-p). See Fig. 8-21.
4. Check the waveform at TP-4. Sync the scope internally and set the time base 10µsec/cm. The negative spike following horizontal sync should exceed peak white (more negative).

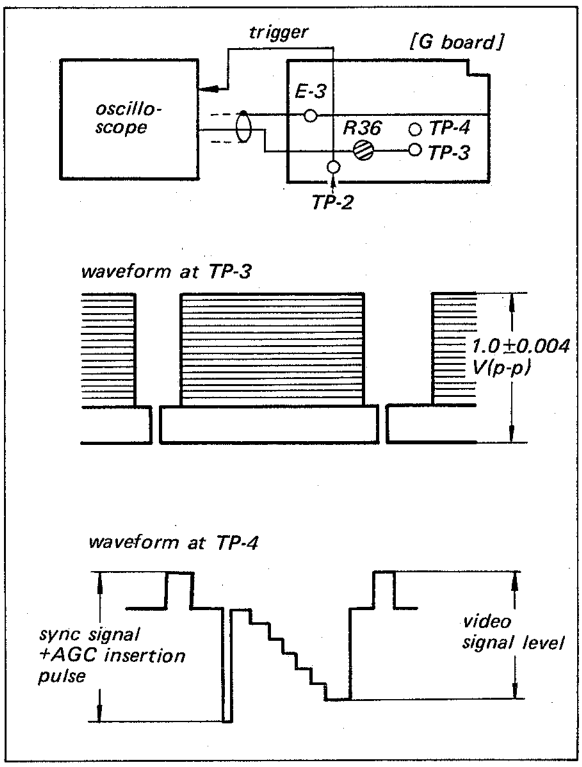

trigger
[G board]
oscillo-scope
E-3
R36
TP-4
TP-3
TP-2
waveform at TP-3
1.0±0.004 V(p-p)
waveform at TP-4
sync signal +AGC insertion pulse
video signal level

Fig. 8-21. Luminance AGC level

8-19. MODULATOR ADJUSTMENTS

Sync-tip Frequency

(Refer to Fig. 8-22.)

1. Set R83 (white clip) fully clockwise.
2. Remove the video input signal.
3. Connect a frequency counter or scope to TP-8 on the G board. Trigger the scope internally. See Fig. 8-22.
4. Adjust L8 for a counter reading of 3.8 MHz. If a scope is used, set the calibrated time base to 0.5µsec/cm. Adjust L8 for 19 complete waveforms in 10 cm.

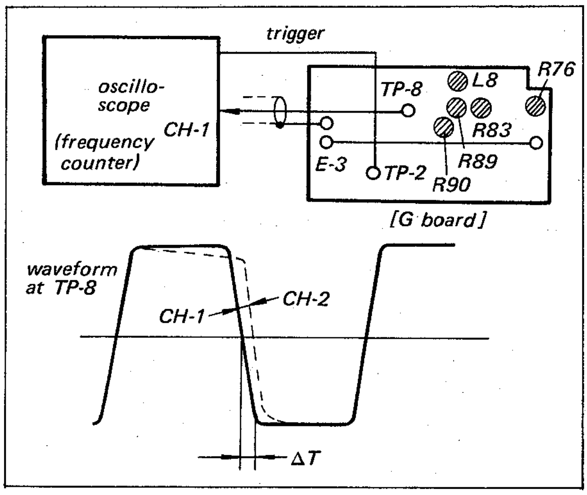

trigger
oscillo-scope (frequency counter)
CH-1
TP-8
L8
R76
R83
E-3
TP-2
R89
R90
[G board]
waveform at TP-8
CH-1
CH-2
ΔT

Fig. 8-22. Waveform symmetry adjustment

Carrier Balance or Waveform Symmetry

5. Connect both probes of a dual-trace scope to TP-8. Make sure that both channels of the scope have identical gains.
6. Set the mode switch to ALT. Adjust gain controls to superimpose both waveforms perfectly.
7. Invert channel 2 (or channel 1) on the scope.
8. Adjust R89 and R90 for perfect waveform symmetry. See Fig. 8-22.
9. Recheck sync-tip frequency by following Steps 1-4 after symmetry has been adjusted.

Peak-White frequency

10. Apply a 1V (p-p) stairstep signal to the VIDEO IN jack.
11. Connect the CH-1 probe of the scope to TP-8. See Fig. 8-23.
12. Trigger the scope externally from TP-12. Set the time-base to 10µsec/cm and adjust scope sync to stop the waveform.
13. Connect an r-f signal generator (0.1V (p-p)) to the CH-2 input of the scope. Set the generator to 5.35 MHz.
14. Set the mode switch on the scope to ADD.
15. Identify the peak-white bar on the added waveform and adjust R76 for an indication of zero beat. (sine waves during the peak-white interval will flatten to horizontal lines).

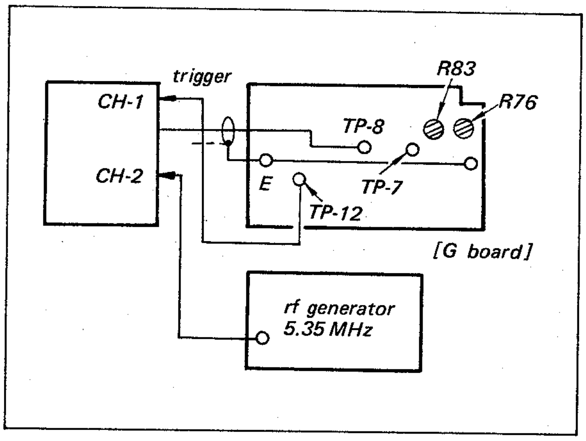

trigger
R83
R76
CH-1
TP-8
CH-2
E
TP-7
TP-12
[G board]
rf generator
5.35 MHz

Fig. 8-23. Peak-white frequency adjustment test setup

White-Clip

16. Connect the scooe to TP-7 and make sure that the conditions set up on the previous steps are unchanged.
17. Set the scope gain controls so that the peak-white to sync signal occupies 2 divisions. See Fig. 8-24 (Ignore spikes.) Adjust R83 (white clip) so that signals 0.8 divisions above peak white are clipped.

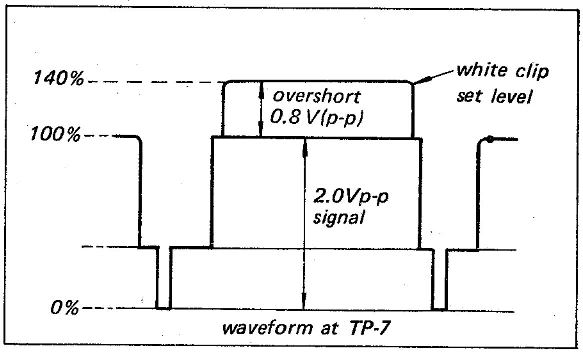

140%
100%
0%
overshort
0.8 V(p-p)
white clip
set level
2.0Vp-p
signal
waveform at TP-7

Fig. 8-24. White-clip adjustment

8-20. ACC (COLOR AGC) ADJUSTMENT

1. Apply a 1V (p-p) color bar signal (75%) to the VIDEO IN jack.
2. Set up the E-to-E mode.
3. Connect the scope probe to TP-13 on the G board (use internal sync, 10μsec/cm time base). See Fig. 8-25.
4. Adjust L10 for the waveform shown in Fig. 8-25.
5. Transfer the scope probe to TP-11.
6. Adjust R135 (ACC Level) for a burst amplitude of 0.45V (p-p) (or 1.0V (p-p) chrominance (if 75% color bars are used). See Fig. 8-26.

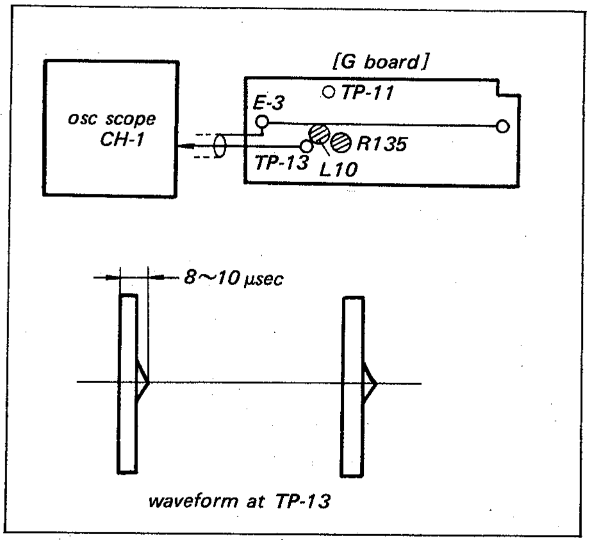

[G board]
osc scope
CH-1
E-3
TP-11
R135
TP-13
L10
8~10 μsec
waveform at TP-13

Fig. 8-25. Burst-gate tuning

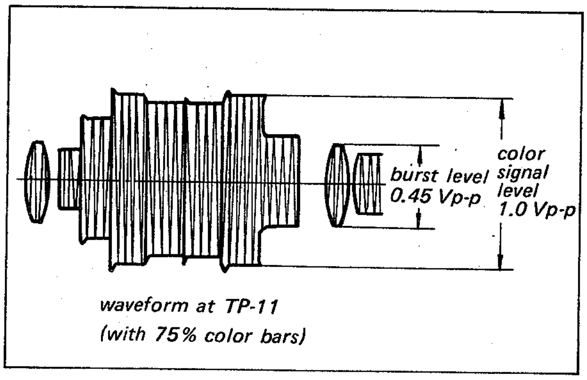

burst level
0.45 Vp-p
color
signal
level
1.0 Vp-p
waveform at TP-11
(with 75% color bars)

Fig. 8-26. ACC adjustment

8-21. COLOR MODE Y LEVEL ADJUSTMENT

1. Apply color-bars at 1V (p-p) to the VIDEO IN jack.
2. Set up the E-to-E mode.
3. Connect the scope probe to TP-5 on the G board. See Fig. 8-27.
4. Adjust R52 for a reading of 1.0V (p-p).

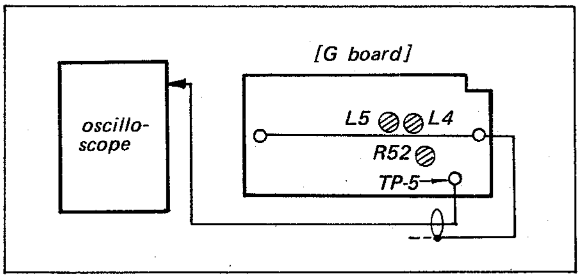

[G board]
oscillo-scope
L5
L4
R52
TP-5

Fig. 8-27. *Color mode Y level adjustment test setup*

8-22. 3.58 MHz TRAP ADJUSTMENTS

1. Repeat Steps 1 to 3 of the previous procedure.
2. Adjust L4 and L5 for minimum 3.58 MHz signals on the Y signal. See Fig. 8-28.

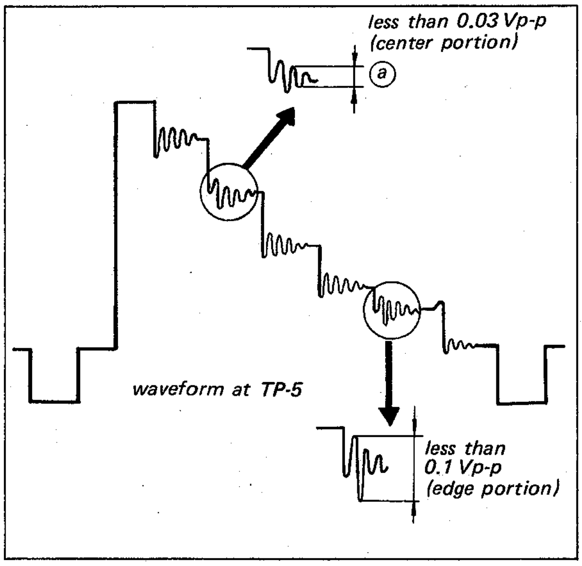

less than 0.03 Vp-p (center portion)
ⓐ
waveform at TP-5
less than 0.1 Vp-p (edge portion)

Fig. 8-28. *Chrominance (3.58 MHz) trap adjustment*

8-23. COLOR KILLER THRESHOLD

A color-bar signal with variable burst is required for this adjustment.

1. Apply the color-bar signal to the VIDEO IN jack.
2. Connect the CH-1 probe of a dual-trace scope to TP-1 on the G board.
3. Connect the CH-2 probe of the scope to TP-18 on the G board. Set input of scope to DC and sensitivity to 5V/cm. A d-c voltmeter may also be used at this test point. See Fig. 8-29.
4. Reduce burst amplitude at TP-1 to 0.085V (p-p).
5. Adjust R143 for zero volts dc at TP-18.
6. Reduce burst amplitude at TP-1 to 0.075V (p-p).
7. Reset R143 for 23V dc at TP-18.
8. Repeat Steps 4 to 7 to obtain the conditions noted in Steps 5 and 7.

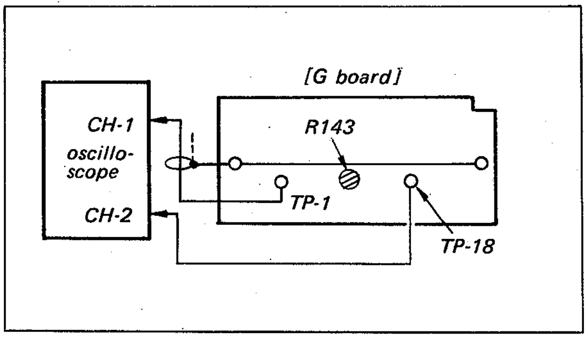

[G board]
CH-1
oscillo-scope
CH-2
R143
TP-1
TP-18

Fig. 8-29. *Color killer threshold adjustment test setup*

8-24. 4.27 MHz OSCILLATOR ADJUSTMENT

1. Apply a 1V (p-p) color-bar signal to the VIDEO IN jack and set up the E-to-E mode.
2. Connect a frequency counter to TP-14 on the G board. See Fig. 8-30.
3. Adjust C109 for a reading of 4,267,919 Hz. See Fig. 8-30.
4. Check output level at TP-14 with the scope. It should be 0.55±0.1V (p-p).

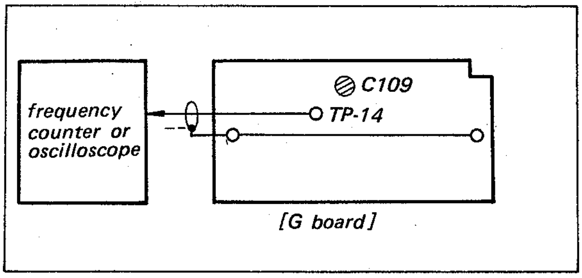

frequency counter or oscilloscope
C109
TP-14
[G board]

Fig. 8-30. *4.27 MHz oscillator adjustment test setup*

8-25. COLOR E-to-E LEVEL

1. Apply a 1V (p-p) color-bar signal to the VIDEO IN jack and set up the E-to-E mode.
2. Connect the scope to the emitter of Q50 on the G board. See Fig. 8-31.
3. Adjust R161 for a burst level of 0.054V (p-p) or 0.12V (p-p) for the full chrominance signal (75% color bars).

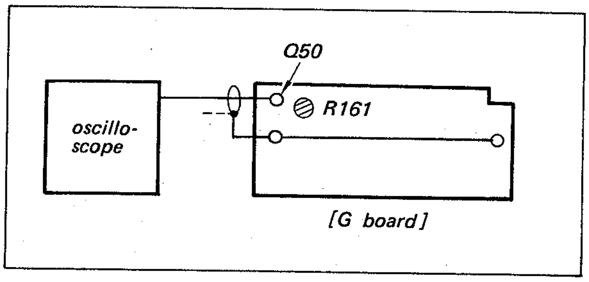


Fig. 8-31. Color E-to-E level adjustment test setup

8-26. Y RECORD LEVEL ADJUSTMENT

The following adjustments are made for both A and B video heads. Items in parenthesis refer to the test points in the B channel.

1. Apply stairstep signal to the VIDEO IN jack.
2. Install a blank cassette
3. Connect the scope probe to TP-19 (TP-20) on the V board. See Fig. 8-32.
4. Connect a microphone to the L/DUB jack.
5. Start the recording.
6. Adjust R184 (R186) on the B-R board for scope readings of 0.9, 0.95, 1.0, 1.05 and 1V (p-p).

   Record each level change by voice.
7. Connect the scope to TP-402 (TP-404) on the B-R board.
8. Playback the section of tape recorded in Step 6 and note the input level (as recorded by voice) that produces maximum playback output.
9. Set up the Record mode and set R184 (R186) for the signal level noted in Step 8.
10. Repeat Steps 1 - 9 for the B channel (items in parenthesis).

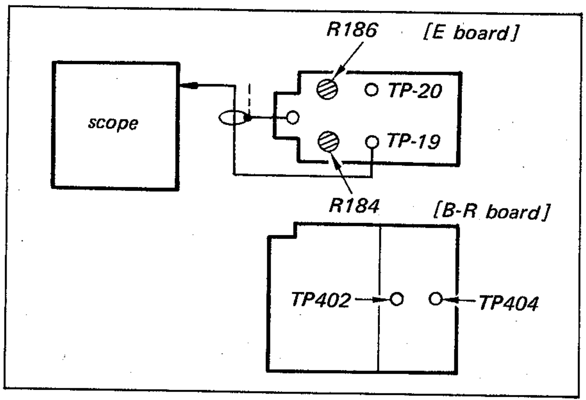


Fig. 8-32. Y record level adjustment test setup

8-27. CHROMINANCE RECORD LEVEL ADJUSTMENT

1. Apply a 1V (p-p) color-bar signal to the VIDEO IN jack.
2. Connect the scope to TP-21 on the V board. See Fig. 8-33.
3. Set up the E-to-E mode.
4. Adjust R162 for a burst level of 0.45V (p-p) or 1.0V (p-p) total chrominance (75% color bars).

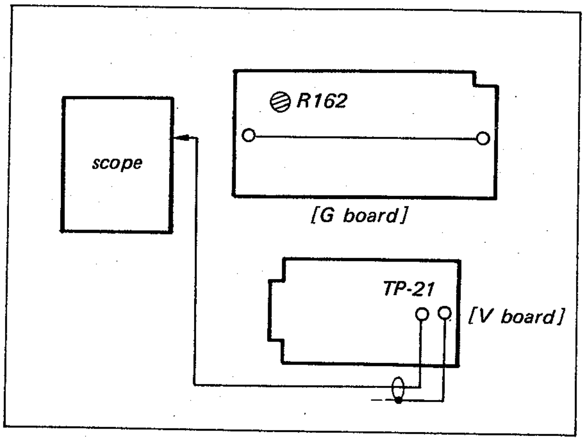


Fig. 8-33. Chrominance record level adjustment test setup

8-28. RECORD FREQUENCY CHARACTERISTICS

Factory Branch Adjustment

1. Lift the input lead from terminal 3 of the V board.
2. Connect a video sweep generator to terminal 3 through a 0.01μF capacitor. See Fig. 8-34.

3. Connect a current probe around the hot lead of the A head at the output of the V board, terminal 7. (B head at terminal (9)). Set sweep width to 6 MHz. See Fig. 8-34.
4. Set up the RECORD mode.
5. Set the sweep generator output level for 47 ma (p-p) at 5 MHz.
6. Adjust R195 (R223) and R197 (R226) for the response shown in Fig. 8-35.
7. Repeat these adjustments for the B channel (items in parenthesis).

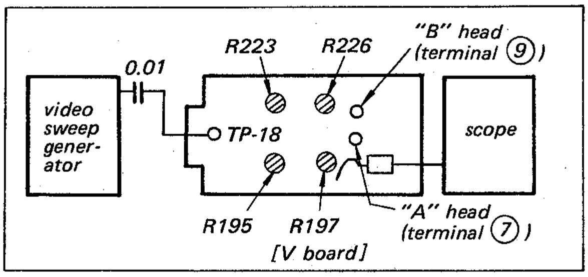

video sweep generator
0.01
TP-18
R223
R226
"B" head (terminal ⑨)
scope
R195
R197
"A" head (terminal ⑦)
[V board]

Fig. 8-34. Record frequency characteristics adjustment test setup

8-29. Y BIAS TRAP ADJUSTMENT (AUDIO DUB)

1. Disconnect signal from the VIDEO IN jack.
2. Prepare the low-pass filter shown in Fig. 8-36. and connect it to the scope.
3. Connect the low-pass filter to TP-405 on the B-R board. See Fig. 8-36.
4. Make a zero-signal recording.
5. Playback the blank recording and set up the AUDIO DUB mode.
6. Adjust L403 for minimum signal as shown in Fig. 8-36.

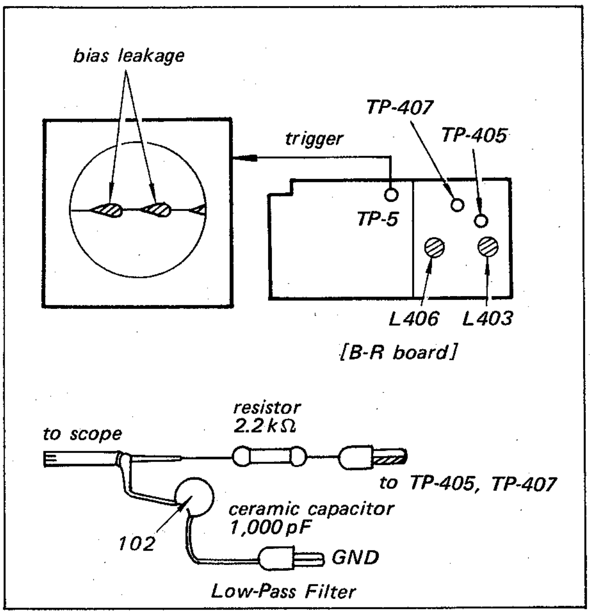

bias leakage
trigger
TP-407
TP-405
TP-5
L406
L403
[B-R board]
to scope
resistor 2.2kΩ
to TP-405, TP-407
ceramic capacitor 1,000pF
102
GND
Low-Pass Filter

Fig. 8-36. Y bias/audio dub bias trap adjustment test setup

8-30. CHROMINANCE BIAS TRAP ADJUSTMENT

1. Connect the scope to TP-407 on the B-R board using the low-pass filter shown in Fig. 8-36.
2. Disconnect the input from the VIDEO IN jack and make a zero-signal recording.
3. Playback the reocrding mode in Step 2 and set up the AUDIO DUB mode.
4. Adjust L406 for minimum bias leakage.

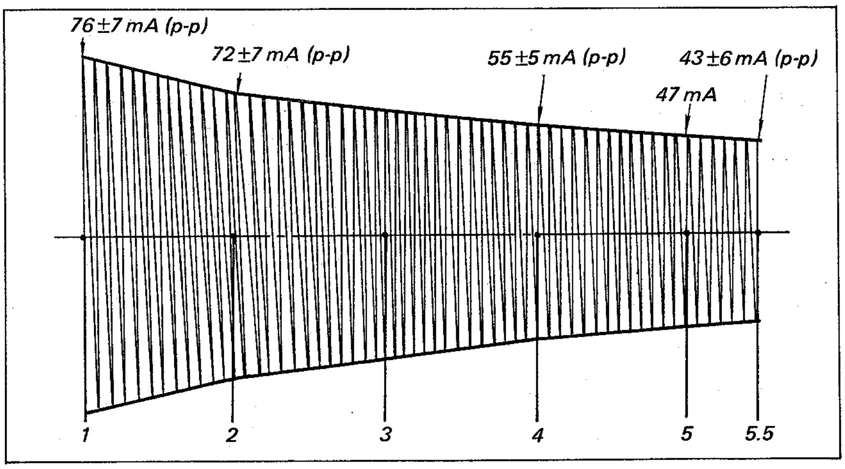


Fig. 8-35. Record characteristic

SECTION 9
AUDIO SYSTEM ALIGNMENT

Test Equipment Requirements

a. Sony VIDEOCASSETTE ALIGNMENT TAPE
b. Ac VTVM
c. 10 k-Ω resistor
d. Audio generator

9-1. AUDIO/CTL HEAD AZIMUTH AND TILT ADJUSTMENTS

1. Connect the VTVM (or oscilloscope) to TP-2 (left channel only) on the C-R board. See Fig. 9-1.
2. Playback the 10-kHz segment of the Alignment Tape.
3. Adjust the azimuth and tilt adjust screws on the Audio/CTL head mount for maximum output. See Fig. 9-2.

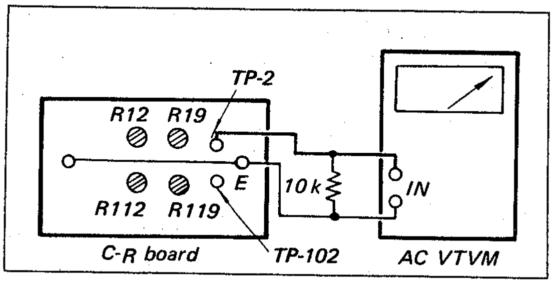


Fig. 9-1. Audio system alignment test setup

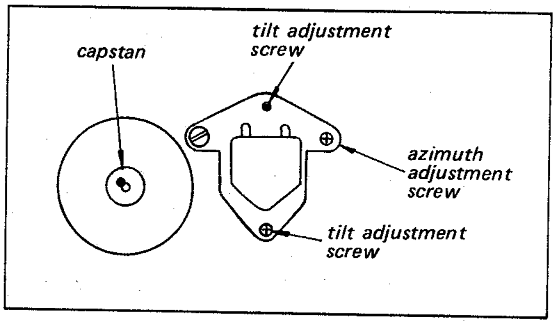


Fig. 9-2. Adjustment parts location

9-2. PLAYBACK LEVEL ADJUSTMENT

1. Connect an ac VTVM to TP-2 on the C-R board (L-CH). See Fig. 9-1.
2. Terminate the L-CH LINE OUT connector with 10 k ohms.
3. Playback the 1-kHz segment of the Alignment Tape.
4. Adjust R19 for a zero dB reading.
5. Transfer the ac VTVM probe to TP-102 on the C-R board (R-CH). See Fig. 9-1.
6. Terminate the R-CH LINE OUT connector with 10 k ohms.
7. Replay the 1-kHz segment of the Alignment Tape.
8. Adjust R119 for a 0 dB (0.775 V) reading.

9-3. PLAYBACK FREQUENCY RESPONSE

1. Perform Procedure 9-2 prior to making this check.
2. Connect an ac VTVM to TP-2 on the C-R board See Fig. 9-1.
3. Terminate the L LINE OUT connector with 10 k ohms.
4. Playback the 10-kHz segment of the Alignment Tape.
5. Check to see that output level is −10dB ± 3dB. Adjust R12 for a −10 dB reading, if necessary. (Note, the 10 kHz tone is recorded at a −10dB level on the Alignment Tape.)
6. Transfer the ac VTVM probe to TP-102 on the C-R board. See Fig. 9-1.
7. Terminate the R LINE OUT connector with 10 k ohms.
8. Playback the 10-kHz segment of the Alignment Tape.
9. Check to see that output level is −10dB ± 3dB. If necessary, adjust R112 for a −10dB reading.

9-4. E-to-E LEVEL

1. Set the INPUT SIGNAL SELECTOR to EXT position.
2. Apply a 1 kHz 0-dB signal to the L AUX IN jack.
3. Connect a 10 kΩ load across the L LINE OUT jack and monitor load voltage with an ac VTVM.
4. Set up the E-to-E mode (Disable the Record Safety Switch by taping down its actuator wire.)
5. Adjust R217 on the H board for a 0 dB reading. See Fig. 9-3.
6. Repeat Steps 1 to 4 for the right channel and adjust R317 for a 0 dB reading. See Fig. 9-3.

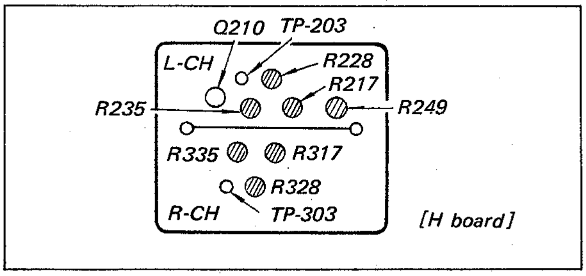


Fig. 9-3. Parts location

9-5. AGC BALANCE ADJUSTMENT

1. Set the INPUT SIGNAL SELECTOR to EXT position.
2. Apply a 1 kHz 0 dB signal to both L and R AUX IN jacks in parallel.
3. Connect a 10 kΩ load across the R LINE OUT jack and monitor output with an ac VTVM.
4. Set up the E-to-E mode.
5. Note output reading and transfer load and VTVM to the L LINE OUT jack. The difference between readings should be within 1 dB.
6. Increase signal level to 10 dB and repeat Steps 3 to 5. The difference between readings should be within 3 dB.
7. If the conditions in Steps 5 and 6 are not met, adjust AGC balance, R249 (See Fig. 9-3) on the H board to secure proper operation.

9-6. AGC DECAY-TIME CHECK

1. Set the INPUT SIGNAL SELECTOR to EXT position.
2. Set up the conditions of Steps 2 and 3 of Section 9-5.
3. Adjust the input signal to +20 dB.
4. Set up the E-to-E mode.
5. Drop the input signal level suddenly to −20 dB and note the minimum level to which output signal drops.
6. Repeat Step 5 several times and time the interval taken for output level to rise 10 dB above the minimum level noted in Step 5. This interval should exceed 15 seconds. Select values for C233 to correct decay time.

9-7. BIAS OSCILLATOR LEVEL CHECK AND ADJUSTMENT

Note: Followings should be performed after replacing the erase head.

1. Connect the scope probe to TP-403 on the E board. See Fig. 9-4.
2. Set up the record mode using a blank cassette.
3. Check the waveform. The output voltage should be 210 V (peak-to-peak) or more without distortion. Adjust R401.

9-8. AUDIO BIAS ADJUSTMENT

1. Set up the record mode without applying any signals. Use a blank cassette.
2. Connect an ac VTVM or oscilloscope to TP-203 (TP-303) on the H board. See Fig. 9-3.
3. Adjust the L401 (L402) (See Fig. 9-4) on the E board for a minimum output.
4. Apply a 1 kHz −20 dB signal to the AUX IN, L-CH jack and connect a microphone to the MIC-IN, R-CH.
5. Short the base of Q210 on the H board to ground. Refer to Fig. 9-3.
6. Connect an ac VTVM to TP-401 on the E board. See Fig. 9-4.
7. Set up the record mode using a blank cassette.
8. Adjust C406 to alter bias voltage in 1 volt steps from 25 to 38 volts and call out the values into the microphone.
9. Playback the cassette and find the value of bias voltage that yields maximum playback level. Reconnect the VTVM to the L LINE-OUT jack, using a 10 kΩ load, for this purpose.
10. Set up the record mode and set C406 for a reading at TP-402 that is 0.5 dB lower than the value noted in Step 9.
11. Repeat Steps 4 to 10 to set bias for the right channel. Reverse microphone and signal-input connections, and monitor bias at TP-401. Adjust C405.
12. Remove the short from the base of Q210.

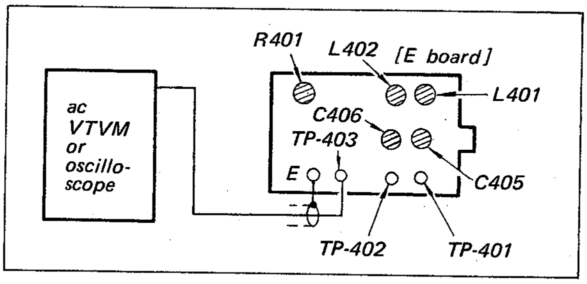


Fig. 9-4. Bias oscillator level and audio bias adjustment

9-9. RECORDING LEVEL ADJUSTMENT

1. Check playback level using the SONY Alignment Cassette. See Section 9-2.
2. Set the INPUT SIGNAL SELECTOR to EXT position, and then apply a 1 kHz -10 dB signal to the L AUX IN jack.
3. Make a recording of this tone.
4. Playback the recording and monitor output level using a 10 kΩ load at the L LINE OUT jack.
5. Output level should be 0 dB±2 dB.
6. If the condition of Step 5 is not met, adjust R228 (See Fig. 9-3) and repeat Steps 2 to 5.
7. Repeat Steps 1 to 6 for the right channel. Adjust R328 (See Fig. 9-3) as required in Step 6.

9-10. OVERALL FREQUENCY RESPONSE

1. Short the base of Q210 on the H board to ground. Refer to Fig. 9-3.
2. Set the INPUT SIGNAL SELECTOR to EXT position, and then apply a -30 dB signal at 70 Hz to the AUX IN, L channel.
3. Make a recording and adjust the frequency of the applied signal to 400 Hz, 1 kHz, 3 kHz, and 10 kHz. Maintain input at -30 dB for all frequency settings.
4. Playback the tape and monitor output at the L LINE OUT jack. Output voltage at the various input frequencies should conform to the following.

70 Hz	0 ± 3 dB
400 Hz	0 ± 1 dB
1 kHz	0 ± 1 dB
3 kHz	0 ± 2 dB
10 kHz	0 +2, -4 dB

5. If the conditions in Step 4 cannot be met, reset R235 (See Fig. 9-3) and repeat Steps 1-4.
6. Perform the same check for the right channel (adjust R335).

9-11. BIAS TRAP ADJUSTMENT IN AUDIO DUB MODE

1. Set up the AUDIO DUB mode without applying any signals. Use a blank cassette.
2. Connect an ac VTVM or oscilloscope to TP-402. See Fig. 9-4.
3. Adjust the dummy coil L6003 on the R board (See Fig. 9-5) mounted on the record function button assembly for a same value as in the RECORD mode.
4. Transfer the input lead of VTVM or oscilloscope to TP-101 and TP-102 (See Fig. 9-6) on the C-R board, and then set up the AUDIO DUB mode by using a blank cassette.
5. Adjust the L101 and L102 (See Fig. 9-6) for a minimum reading at TP-101 and TP-102 respectively.

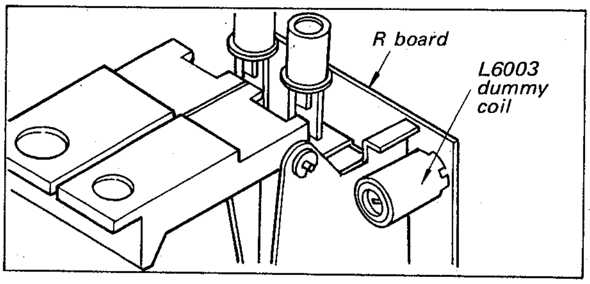


Fig. 9-5. Audio dub dummy coil adjustment

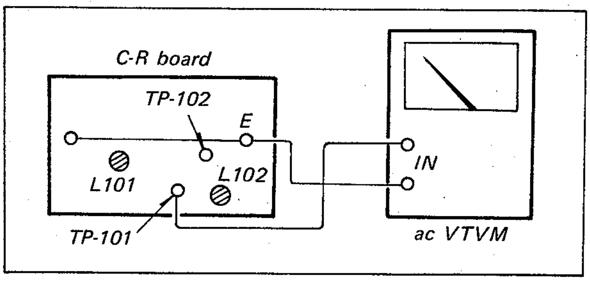


Fig. 9-6. Audio dub bias trap adjustment test setup

SECTION 10
REPACKING

The VO-1600's original shipping carton and packing materials are the ideal containers for shipping the unit. However to secure the maximum protection, the VO-1600 must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 10-1.

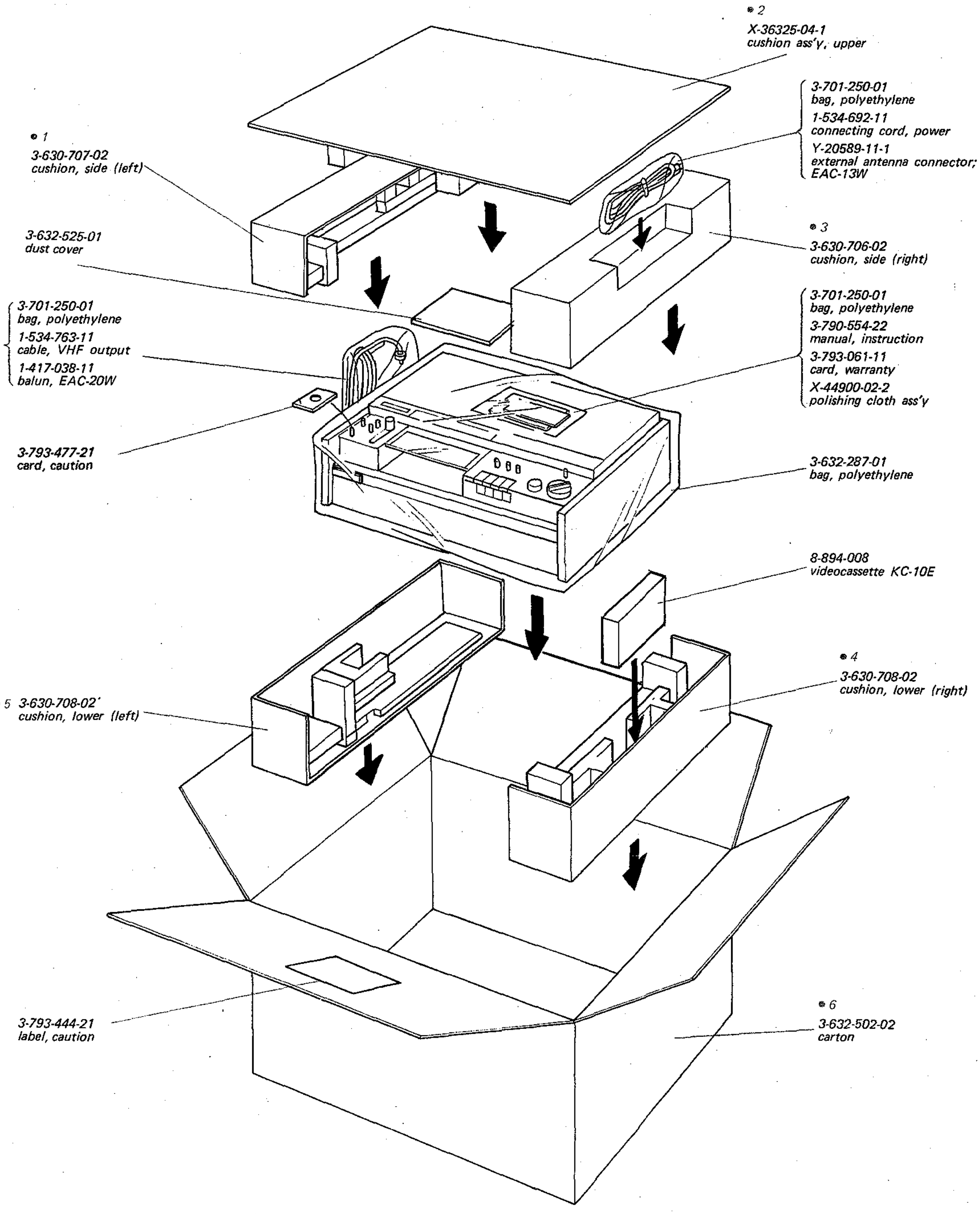

● 2
X-36325-04-1
cushion ass'y, upper
● 1
3-630-707-02
cushion, side (left)
3-701-250-01
bag, polyethylene
1-534-692-11
connecting cord, power
Y-20589-11-1
external antenna connector; EAC-13W
3-632-525-01
dust cover
● 3
3-630-706-02
cushion, side (right)
3-701-250-01
bag, polyethylene
1-534-763-11
cable, VHF output
1-417-038-11
balun, EAC-20W
3-701-250-01
bag, polyethylene
3-790-554-22
manual, instruction
3-793-061-11
card, warranty
X-44900-02-2
polishing cloth ass'y
3-793-477-21
card, caution
3-632-287-01
bag, polyethylene
8-894-008
videocassette KC-10E
● 4
3-630-708-02
cushion, lower (right)
● 5 3-630-708-02'
cushion, lower (left)
3-793-444-21
label, caution
● 6
3-632-502-02
carton

Fig. 10-1. Repacking

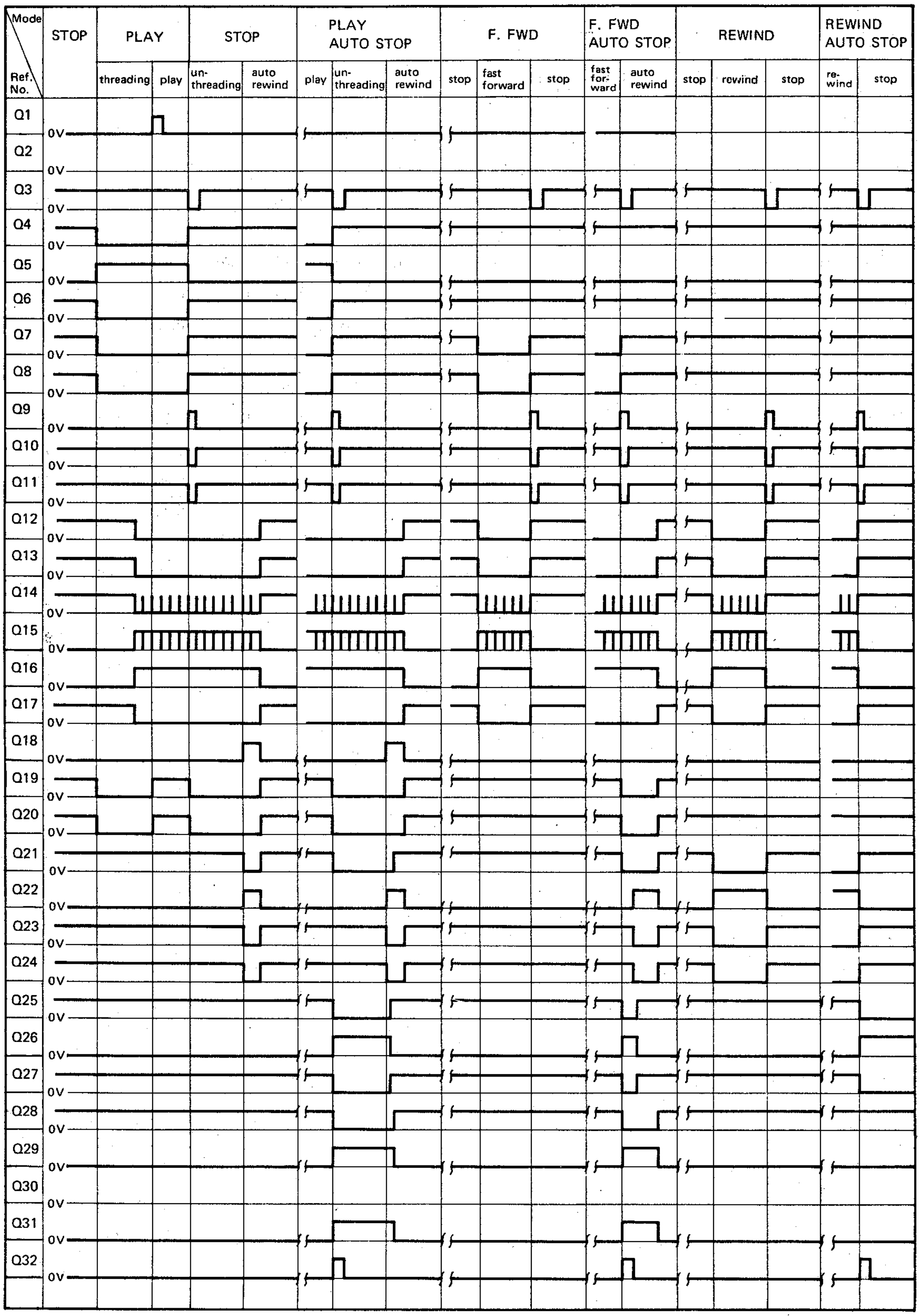
SECTION 11
CHARTS AND DIAGRAMS

11-1. SYSTEM CONTROL VOLTAGE CHART – D Board –

	STOP		PLAY				FINISH UN-THREADING		F. FORWARD		REWIND		PLAY → AUTO STOP		F.F. → AUTO STOP	
			THREADING		PLAY											
	Vb (volt)	Vc	Vb (volt)	Vc	Vb (volt)	Vc	Vb (volt)	Vc	Vb (volt)	Vc	Vb (volt)	Vc	Vb (volt)	Vc	Vb (volt)	Vc
Q1	0.65	0.05	0.65	0.05	0	8.7	0.65	0.05	0.65	0.05	0.65	0.05	0.65	0.05	0.65	0.05
Q2	0.02	0.02	0.02	0.02	0.65	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Q3	0.02	10	0.02	9.1	0.02	9.1	0.65	0.05	0.02	9.1	0.02	9.1	0.65	0.05	0.65	0.05
Q4	0	9.4	0.65	0.05	0.65	0.05	0	9.4	0	9.4	0	9.4	0	9.4	0	9.4
Q5	0.65	0.05	0.02	5.6	0.02	5.6	0.65	0.05	0.65	0.05	0.65	0.05	0.65	0.05	0.65	0.05
Q6	0.04	13	0.8	0.35	0.8	0.35	0.04	13	0.04	13	0.04	13	0.04	13	0.04	13
Q7	0.03	13	1.4	0.8	1.4	0.8	0.03	13	1.4	0.8	0.03	13	0.03	13	0.03	13
Q8	0.15	13	0.75	0.8	0.75	0.8	0.15	13	0.75	0.8	0.15	13	0.15	13	0.15	13
Q9	0.65	0.05	0.65	0.05	0.65	0.05	0	5	0.65	0.05	0.65	0.05	0	5	0	5
Q10	0.05	13	0.05	13	0.05	13	1.3	0.95	0.05	13	0.05	13	1.3	0.95	1.3	0.95
Q11	0.1	13	0.1	13	0.1	13	0.75	0.95	0.1	13	0.1	13	0.75	0.95	0.1	13
Q12	0.01	13	1.35	0.77	1.35	0.77	1.35	0.77	1.35	0.77	1.35	0.77	1.35	0.77	1.35	0.77
Q13	0.01	13	0.75	0.77	0.75	0.77	0.75	0.77	0.75	0.77	0.75	0.77	0.75	0.77	0.75	0.77
Q14	0.02	4.2	0.02	4.2	0.02	4.2	0.02	4.2	0.02	4.2	0.02	4.2	0.02	4.2	0.02	4.2
Q15	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06
Q16	0.65	0.1	0.36	5	0.36	5	0.36	5	0.36	5	0.36	5	0.36	5	0.36	5
Q17	0.09	13	0.8	0.16	0.8	0.16	0.8	0.16	0.8	0.16	0.8	0.16	0.8	0.16	0.8	0.16
Q18	0.65	0.04	0.65	0.04	0.65	0.04	0	7.5	0.65	0.04	0.65	0.04	0	7.5	0.65	0.04
Q19	0	13	1.35	0.9	0	13	1.35	0.9	0	13	0	13	1.35	0.9	1.35	0.9
Q20	0	13	0.75	0.9	0	13	0.75	0.9	0	13	0	13	0.75	0.9	0.75	0.9
Q21	0.01	9.4	0.01	9.4	0.01	9.4	0.65	0.05	0.01	9.4	0.65	0.05	0.65	0.05	0.65	0.05
Q22	0.65	0.05	0.65	0.05	0.65	0.05	0.03	7.4	0.65	0.05	0.03	7.4	0.03	7.4	0.03	7.4
Q23	0.04	13	0.04	13	0.04	13	1.45	0.8	1.45	0.8	1.45	0.8	1.45	0.8	1.45	0.8
Q24	0.04	13	0.04	13	0.04	13	0.75	0.8	0.04	13	0.75	0.8	0.75	0.8	0.75	0.8
Q25	0.02	6.2	0.02	6.2	0.02	6.2	0.02	6.2	0.02	6.2	0.02	6.2	0.6	0.06	0.6	0.06
Q26	2.4	1.8	2.4	1.8	2.4	1.8	2.4	1.8	2.4	1.8	2.4	1.8	0.06	1.6	0.06	1.6
Q27	0.6	2.4	0.6	2.4	0.6	2.4	0.6	2.4	0.6	2.4	0.6	2.4	0.6	2.4	0.6	2.4
Q28	0.06	7.3	0.06	7.3	0.06	7.3	0.06	7.3	0.06	7.3	0.06	7.3	0.65	0.07	0.65	0.07
Q29	0.65	0.07	0.65	0.07	0.65	0.07	0.65	0.07	0.65	0.07	0.65	0.07	0.06	7.3	0.06	7.3
Q30	0	0.08	0	0.08	0	0.08	0	0.08	0	0.08	0	0.08	0.	0.08	0	0.08
Q31	0.07	Ve=0.1	0.07	Ve=0.1	0.07	Ve=0.1	0.07	Ve=0.1	0.07	Ve=0.1	0.07	Ve=0.1	0.65	Ve=8.	0.65	Ve=8.
Q32	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0.65	0.06	0	7.5	0	7.5

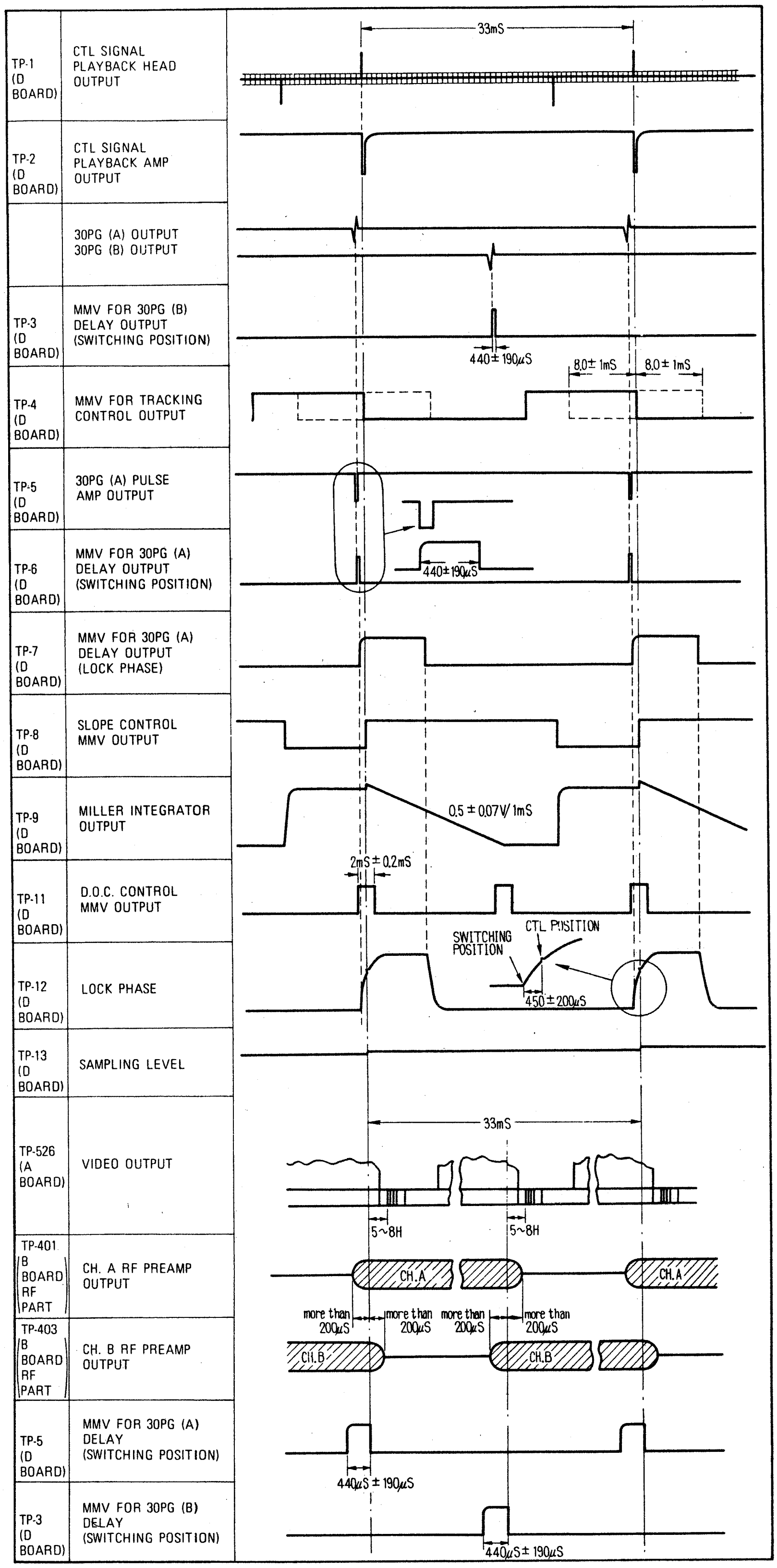
Note: Vb: base voltage
Vc: collector voltage
Ve: emitter voltage

11-2. SYSTEM CONTROL TIMING CHART – D Board –


Mode
Ref. No.
STOP
PLAY
STOP
PLAY AUTO STOP
F. FWD
F. FWD AUTO STOP
REWIND
REWIND AUTO STOP
threading
play
un-threading
auto rewind
play
un-threading
auto rewind
stop
fast forward
stop
fast for-ward
auto rewind
stop
rewind
stop
re-wind
stop
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
Q29
Q30
Q31
Q32
0V

Note: All waveforms are measured at the collector except Q31.
The waveform of Q31 is measured at the emitter.

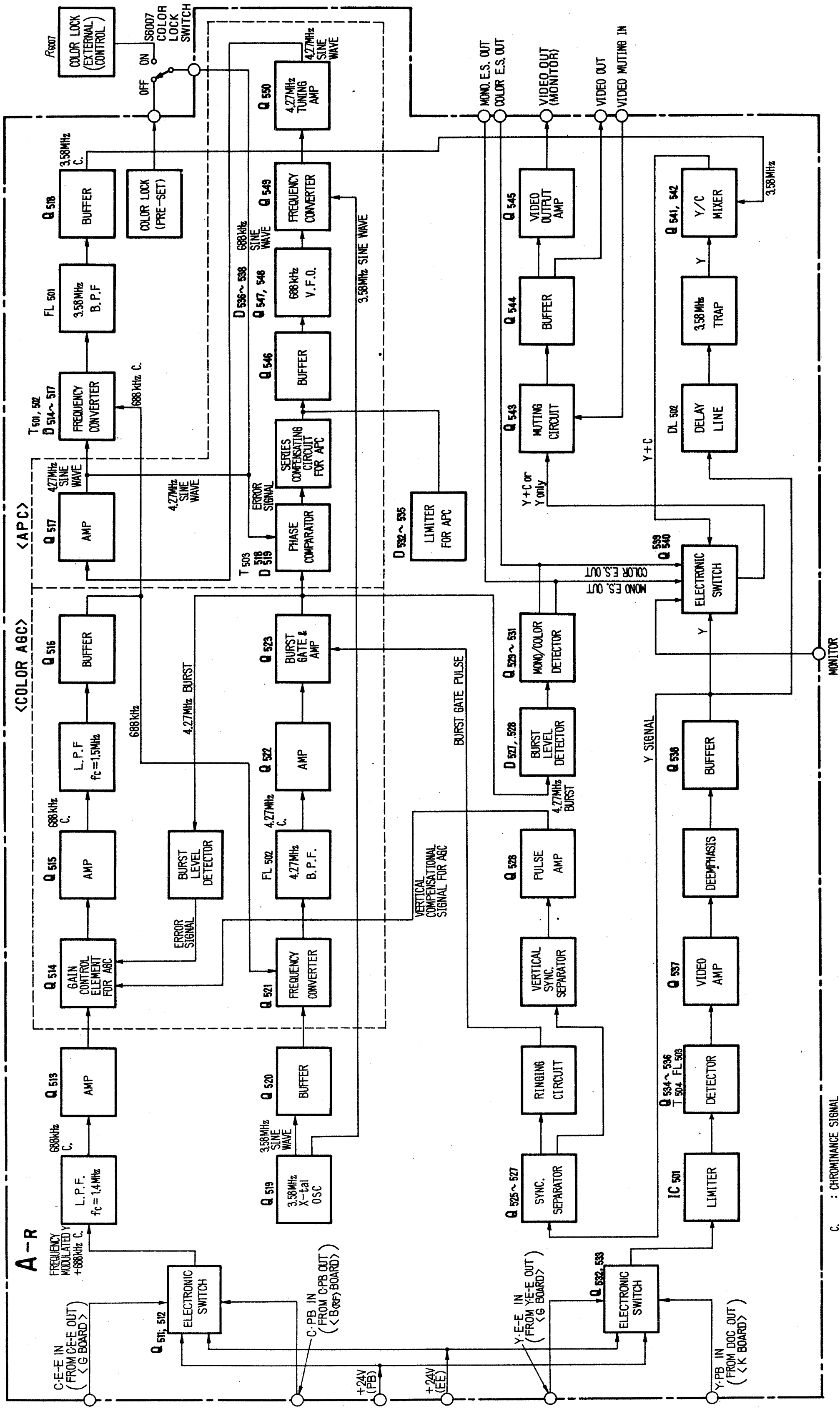
11-3. SERVO SYSTEM TIMING CHART – A-R, B-R, C-R Board –


TP-1 (D BOARD)
CTL SIGNAL PLAYBACK HEAD OUTPUT
33mS
TP-2 (D BOARD)
CTL SIGNAL PLAYBACK AMP OUTPUT
30PG (A) OUTPUT
30PG (B) OUTPUT
TP-3 (D BOARD)
MMV FOR 30PG (B) DELAY OUTPUT (SWITCHING POSITION)
440± 190μS
8.0± 1mS
8.0± 1mS
TP-4 (D BOARD)
MMV FOR TRACKING CONTROL OUTPUT
TP-5 (D BOARD)
30PG (A) PULSE AMP OUTPUT
TP-6 (D BOARD)
MMV FOR 30PG (A) DELAY OUTPUT (SWITCHING POSITION)
440± 190μS
TP-7 (D BOARD)
MMV FOR 30PG (A) DELAY OUTPUT (LOCK PHASE)
TP-8 (D BOARD)
SLOPE CONTROL MMV OUTPUT
TP-9 (D BOARD)
MILLER INTEGRATOR OUTPUT
0.5 ± 0.07V/ 1mS
2mS ± 0.2mS
TP-11 (D BOARD)
D.O.C. CONTROL MMV OUTPUT
SWITCHING POSITION
CTL POSITION
TP-12 (D BOARD)
LOCK PHASE
450 ± 200μS
TP-13 (D BOARD)
SAMPLING LEVEL
33mS
TP-526 (A BOARD)
VIDEO OUTPUT
5~8H
5~8H
TP-401 (B BOARD RF PART)
CH. A RF PREAMP OUTPUT
CH.A
CH.A
more than 200μS
more than 200μS
more than 200μS
more than 200μS
TP-403 (B BOARD RF PART)
CH. B RF PREAMP OUTPUT
CH.B
CH.B
TP-5 (D BOARD)
MMV FOR 30PG (A) DELAY (SWITCHING POSITION)
440μS ± 190μS
TP-3 (D BOARD)
MMV FOR 30PG (B) DELAY (SWITCHING POSITION)
440μS ± 190μS

Note:

MMV: MONOSTABLE MULTIVIBRATOR
30PG: 30 Hz PULSE GENERATOR
DOC: DROPOUT COMPENSATOR

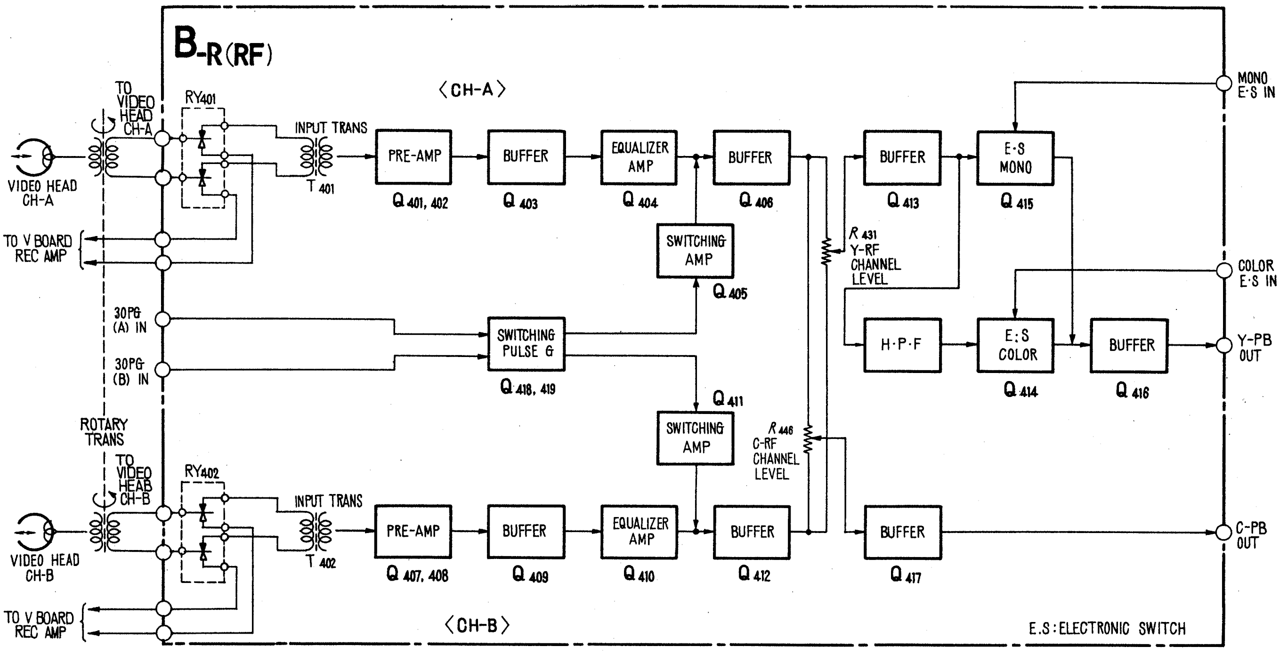
11-4. BLOCK DIAGRAM – A-R Board –



A-R
C-E-E IN (FROM C-E-E OUT) (<G BOARD>)
Q 511, 512 ELECTRONIC SWITCH
FREQUENCY MODULATED Y +688kHz C.
L.P.F. fc=1.4MHz
688kHz C.
Q 513 AMP
Q 514 GAIN CONTROL ELEMENT FOR AGC
Q 515 AMP
688kHz C.
L.P.F fc=1.5MHz
Q 516 BUFFER
<COLOR AGC>
<APC>
Q 517 AMP
4.27MHz SINE WAVE
T 501, 502 D 514~517 FREQUENCY CONVERTER
688kHz C.
FL 501 3.58MHz B.P.F
Q 518 BUFFER
3.58MHz C.
COLOR LOCK (PRE-SET)
R 6007 COLOR LOCK (EXTERNAL) (CONTROL)
OFF
ON
S 6007 COLOR LOCK SWITCH
BURST LEVEL DETECTOR
ERROR SIGNAL
688kHz
4.27MHz BURST
4.27MHz SINE WAVE
C-PB IN (FROM C-PB OUT) (<B(RF) BOARD>)
Q 519 3.58MHz X-tal OSC
3.58MHz SINE WAVE
Q 520 BUFFER
Q 521 FREQUENCY CONVERTER
FL 502 4.27MHz B.P.F.
4.27MHz C.
Q 522 AMP
Q 523 BURST GATE & AMP
T 503 D 518 D 519 PHASE COMPARATOR
ERROR SIGNAL
SERIES COMPENSATING CIRCUIT FOR APC
Q 546 BUFFER
D 536~538 Q 547, 548 688kHz V.F.O.
688kHz SINE WAVE
Q 549 FREQUENCY CONVERTER
3.58MHz SINE WAVE
Q 550 4.27MHz TUNING AMP
4.27MHz SINE WAVE
D 532~535 LIMITER FOR APC
+24V (PB)
+24V (EE)
VERTICAL COMPENSATIONAL SIGNAL FOR AGC
BURST GATE PULSE
Y-E-E IN (FROM Y-E-E OUT) (<G BOARD>)
Q 525~527 SYNC. SEPARATOR
RINGING CIRCUIT
VERTICAL SYNC. SEPARATOR
Q 528 PULSE AMP
D 527, 528 BURST LEVEL DETECTOR
4.27MHz BURST
Q 529~531 MONO/COLOR DETECTOR
MONO E.S. OUT
COLOR E.S. OUT
Y+C or Y only
Q 543 MUTING CIRCUIT
Q 544 BUFFER
Q 545 VIDEO OUTPUT AMP
MONO. E.S. OUT
COLOR E.S. OUT
VIDEO OUT (MONITOR)
VIDEO OUT
VIDEO MUTING IN
Y-PB IN (FROM DOC OUT) (<K BOARD>)
Q 532, 533 ELECTRONIC SWITCH
IC 501 LIMITER
Q 534~536 T 504 FL 503 DETECTOR
Q 537 VIDEO AMP
DEEMPHASIS
Q 538 BUFFER
Y SIGNAL
Y
Q 539 Q 540 ELECTRONIC SWITCH
Y+C
DL 502 DELAY LINE
3.58MHz TRAP
Y
Q 541, 542 Y/C MIXER
3.58MHz
MONITOR SELECT SWITCH
C. : CHROMINANCE SIGNAL
E.S. : ELECTRONIC SWITCH
V.F.O. : VARIABLE FREQUENCY OSCILLATOR

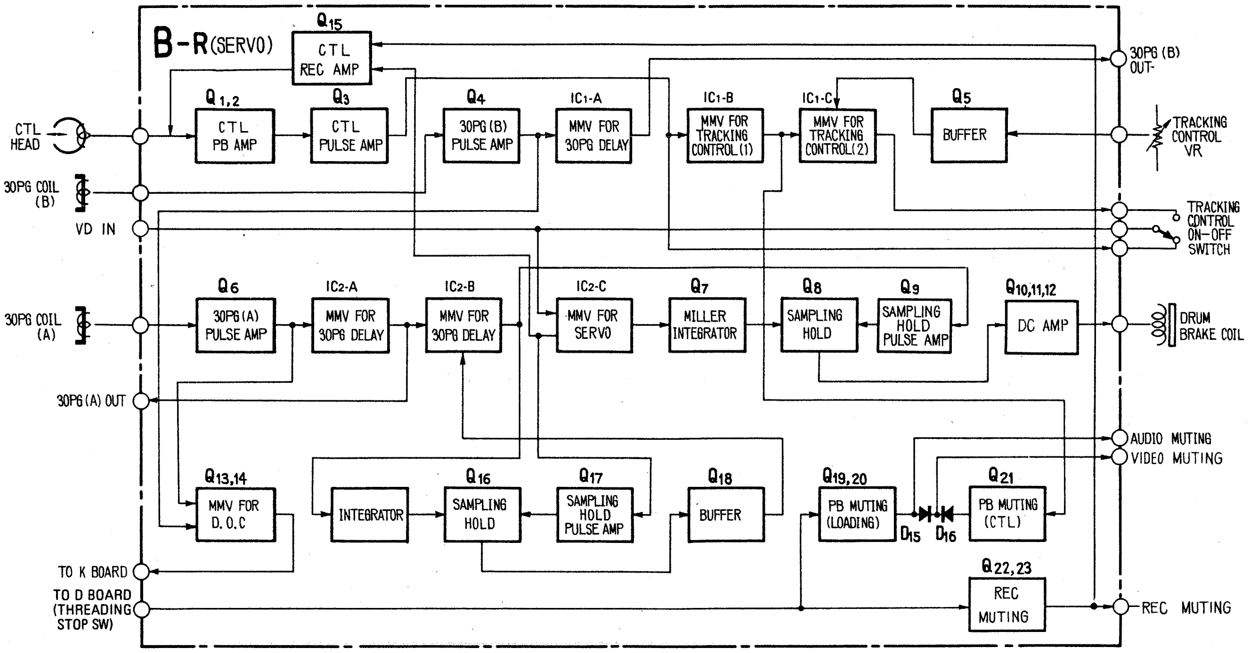
Note: All reference numbers of components in this diagram are in 1000 series.

11-5. BLOCK DIAGRAM – B-R Board –
(RF Section)


B-R(RF)
〈CH-A〉
TO VIDEO HEAD CH-A
RY401
INPUT TRANS
T401
VIDEO HEAD CH-A
TO V BOARD REC AMP
PRE-AMP
Q401, 402
BUFFER
Q403
EQUALIZER AMP
Q404
BUFFER
Q406
SWITCHING AMP
Q405
R431 Y-RF CHANNEL LEVEL
BUFFER
Q413
E-S MONO
Q415
MONO E·S IN
COLOR E·S IN
H·P·F
E·S COLOR
Q414
BUFFER
Q416
Y-PB OUT
30PG (A) IN
30PG (B) IN
SWITCHING PULSE G
Q418, 419
Q411
SWITCHING AMP
R446 C-RF CHANNEL LEVEL
ROTARY TRANS
TO VIDEO HEAD CH-B
RY402
INPUT TRANS
T402
VIDEO HEAD CH-B
PRE-AMP
Q407, 408
BUFFER
Q409
EQUALIZER AMP
Q410
BUFFER
Q412
BUFFER
Q417
C-PB OUT
TO V BOARD REC AMP
〈CH-B〉
E.S: ELECTRONIC SWITCH

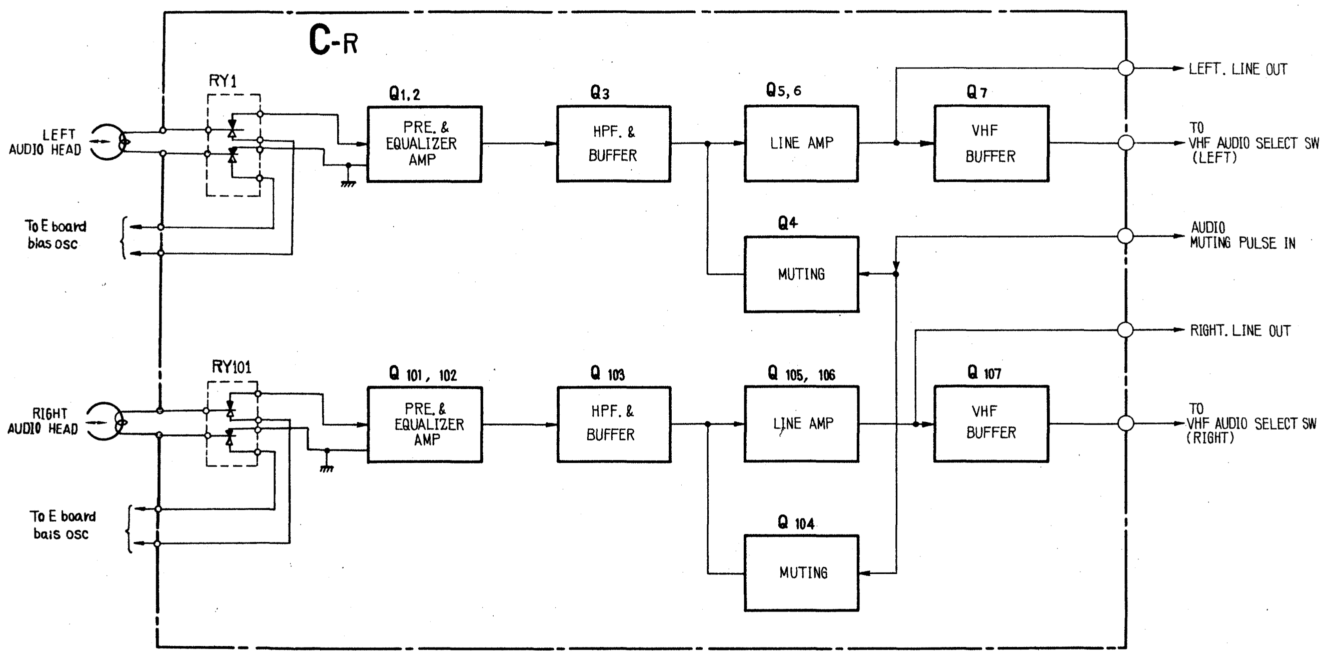
Note: All reference numbers of components in this diagram are in 1000 series.

(SERVO Section)


B-R(SERVO)
Q15
CTL REC AMP
Q1,2
CTL PB AMP
Q3
CTL PULSE AMP
Q4
30PG (B) PULSE AMP
IC1-A
MMV FOR 30PG DELAY
IC1-B
MMV FOR TRACKING CONTROL (1)
IC1-C
MMV FOR TRACKING CONTROL (2)
Q5
BUFFER
CTL HEAD
30PG COIL (B)
VD IN
30PG (B) OUT
TRACKING CONTROL VR
TRACKING CONTROL ON-OFF SWITCH
Q6
30PG (A) PULSE AMP
IC2-A
MMV FOR 30PG DELAY
IC2-B
MMV FOR 30PG DELAY
IC2-C
MMV FOR SERVO
Q7
MILLER INTEGRATOR
Q8
SAMPLING HOLD
Q9
SAMPLING HOLD PULSE AMP
Q10,11,12
DC AMP
30PG COIL (A)
DRUM BRAKE COIL
30PG (A) OUT
AUDIO MUTING
VIDEO MUTING
Q13,14
MMV FOR D.O.C
INTEGRATOR
Q16
SAMPLING HOLD
Q17
SAMPLING HOLD PULSE AMP
Q18
BUFFER
Q19,20
PB MUTING (LOADING)
D15
D16
Q21
PB MUTING (CTL)
Q22,23
REC MUTING
TO K BOARD
TO D BOARD (THREADING STOP SW)
REC MUTING

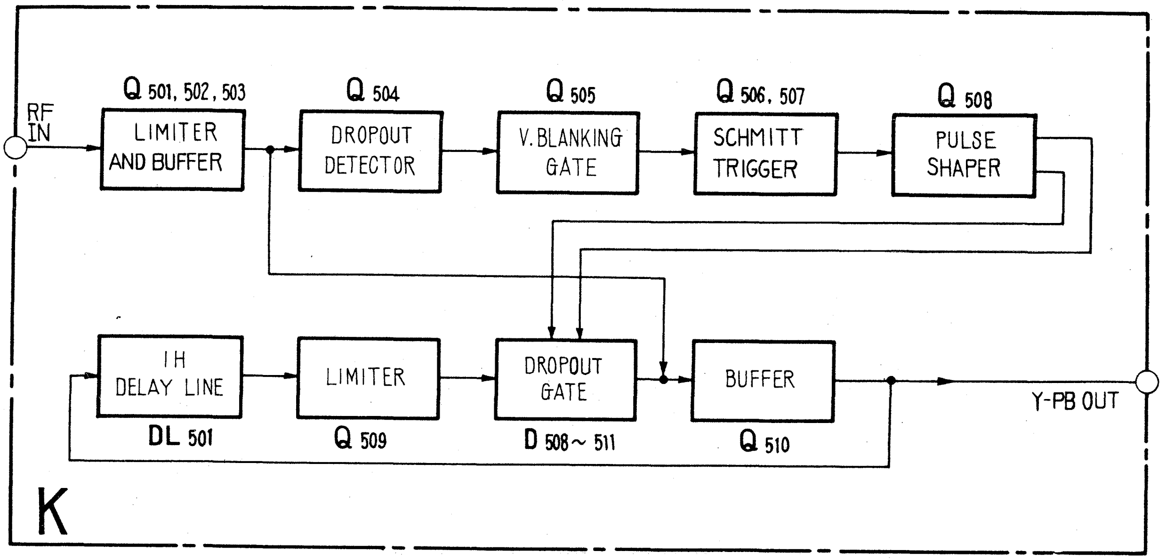
Note: All reference numbers of components in this diagram are in 3000 series.

11-6. BLOCK DIAGRAM — C-R Board and K Board —
(C-R Board)


C-R
RY1
LEFT AUDIO HEAD
To E board bias osc
Q1,2
PRE. & EQUALIZER AMP
Q3
HPF. & BUFFER
Q5,6
LINE AMP
Q7
VHF BUFFER
Q4
MUTING
LEFT. LINE OUT
TO VHF AUDIO SELECT SW (LEFT)
AUDIO MUTING PULSE IN
RIGHT. LINE OUT
RY101
RIGHT AUDIO HEAD
To E board bais osc
Q 101, 102
PRE. & EQUALIZER AMP
Q 103
HPF. & BUFFER
Q 105, 106
LINE AMP
Q 107
VHF BUFFER
Q 104
MUTING
TO VHF AUDIO SELECT SW (RIGHT)

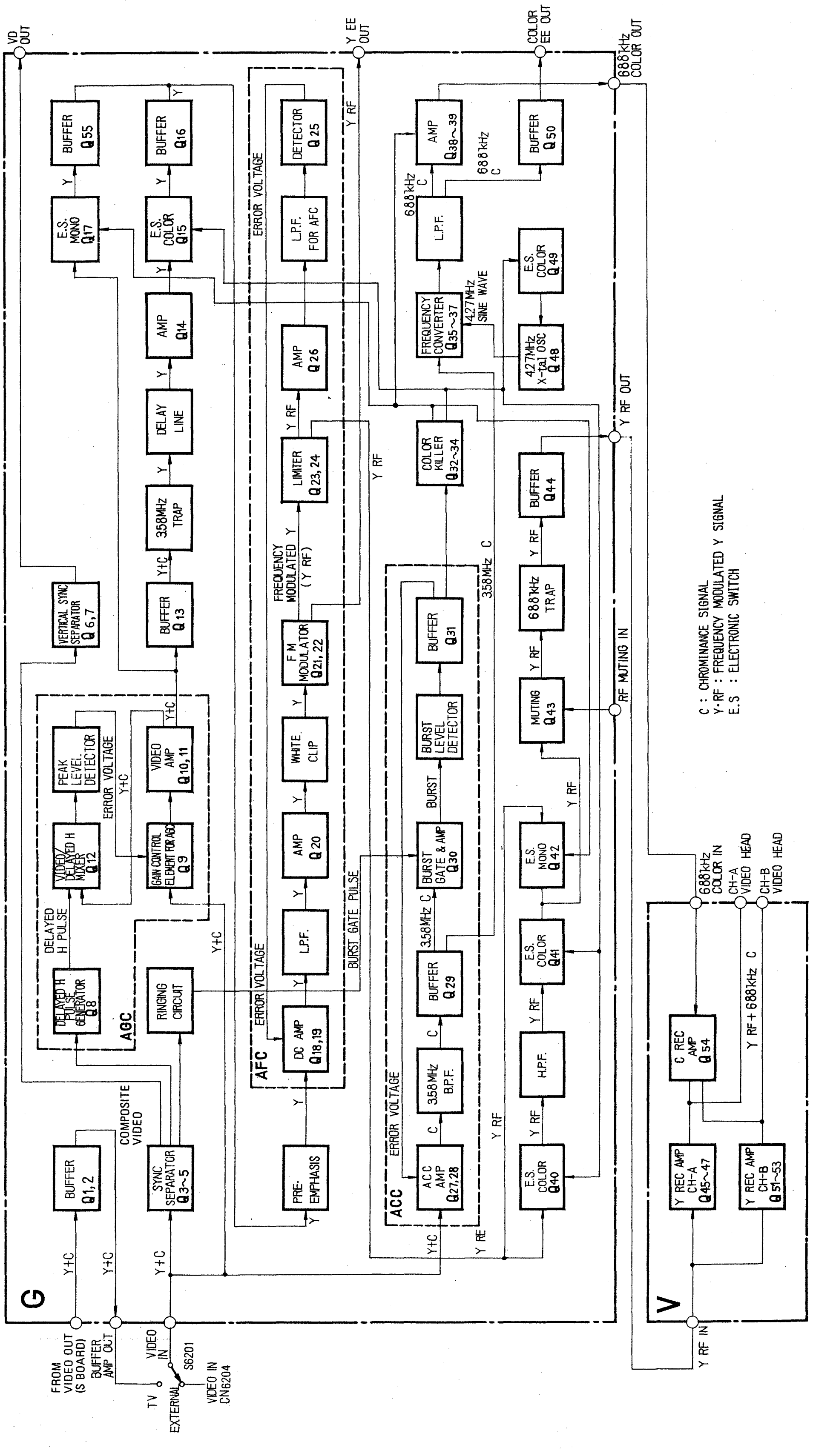
Note: All reference numbers of components in this diagram are in 2000 series.

(K Board)


RF IN
Q 501, 502, 503
LIMITER AND BUFFER
Q 504
DROPOUT DETECTOR
Q 505
V. BLANKING GATE
Q 506, 507
SCHMITT TRIGGER
Q 508
PULSE SHAPER
1H DELAY LINE
DL 501
LIMITER
Q 509
DROPOUT GATE
D 508~511
BUFFER
Q 510
Y-PB OUT
K

Note: All reference numbers of components in this diagram are in 1000 series.

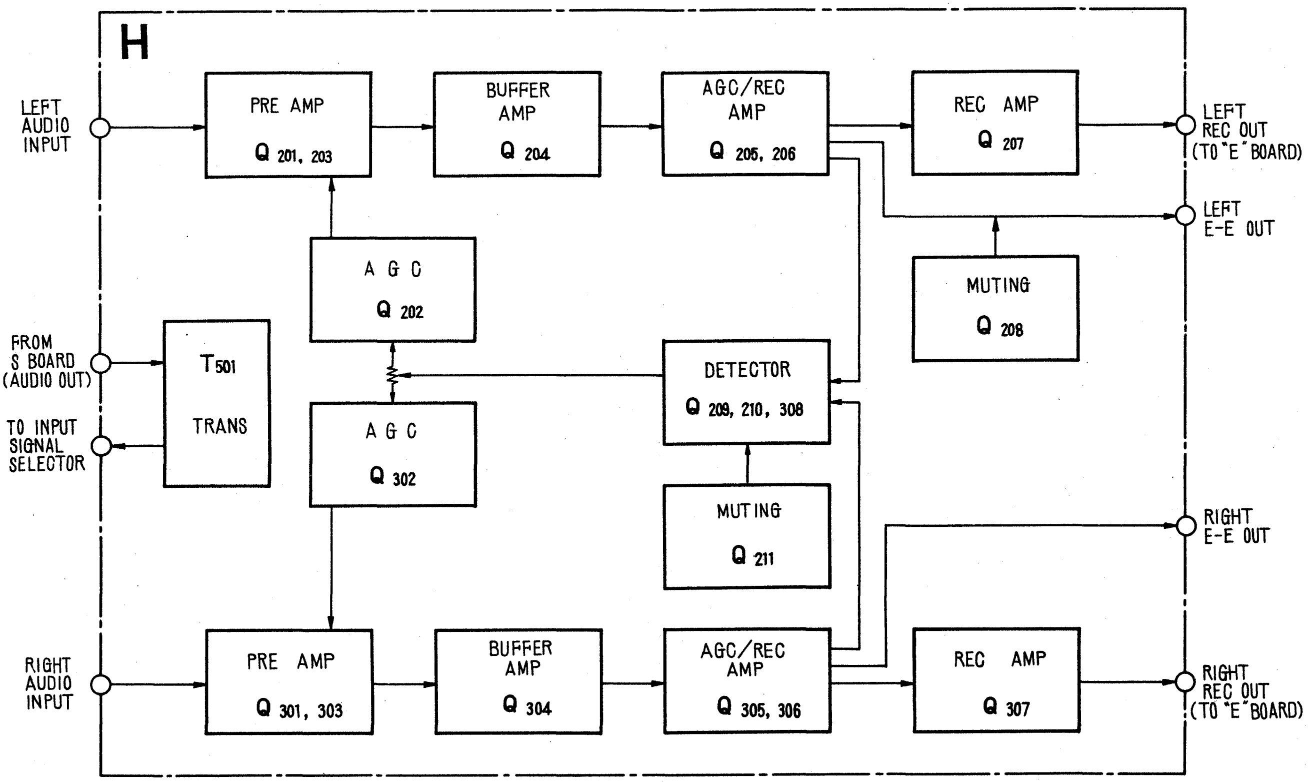
11-7. BLOCK DIAGRAM – G Board and V Board –


VD OUT
BUFFER Q55
E.S. MONO Q17
VERTICAL SYNC SEPARATOR Q6,7
PEAK LEVEL DETECTOR
VIDEO/DELAYED H MIXER Q12
DELAYED H PULSE GENERATOR Q8
DELAYED H PULSE
AGC
ERROR VOLTAGE
BUFFER Q1,2
SYNC SEPARATOR Q3~5
COMPOSITE VIDEO
BUFFER Q16
E.S. COLOR Q15
AMP Q14
DELAY LINE
3.58MHz TRAP
BUFFER Q13
VIDEO AMP Q10,11
GAIN CONTROL ELEMENT FOR AGC Q9
RINGING CIRCUIT
Y+C
Y EE OUT
DETECTOR Q25
L.P.F. FOR AFC
AMP Q26
LIMITER Q23,24
FREQUENCY MODULATED Y (Y RF)
F M MODULATOR Q21,22
WHITE CLIP
AMP Q20
L.P.F.
DC AMP Q18,19
AFC
PRE-EMPHASIS
BURST GATE PULSE
Y RF
COLOR EE OUT
688kHz COLOR OUT
AMP Q38~39
688kHz C
L.P.F.
FREQUENCY CONVERTER Q35~37
4.27MHz SINE WAVE
COLOR KILLER Q32~34
3.58MHz C
BUFFER Q31
BURST LEVEL DETECTOR
BURST
BURST GATE & AMP Q30
BUFFER Q29
3.58MHz B.P.F.
ACC AMP Q27,28
ACC
BUFFER Q50
E.S. COLOR Q49
4.27MHz X-tal OSC Q48
Y RF OUT
BUFFER Q44
688kHz TRAP
MUTING Q43
RF MUTING IN
E.S MONO Q42
E.S. COLOR Q41
H.P.F.
E.S. COLOR Q40
Y RE
688kHz COLOR IN
CH-A VIDEO HEAD
CH-B VIDEO HEAD
C REC AMP Q54
Y RF + 688kHz C
Y REC AMP CH-A Q45~47
Y REC AMP CH-B Q51~53
V
Y RF IN
G
FROM VIDEO OUT (S BOARD)
BUFFER AMP OUT
VIDEO IN
S6201
TV
EXTERNAL
VIDEO IN CN6204

C : CHROMINANCE SIGNAL
Y-RF : FREQUENCY MODULATED Y SIGNAL
E.S : ELECTRONIC SWITCH

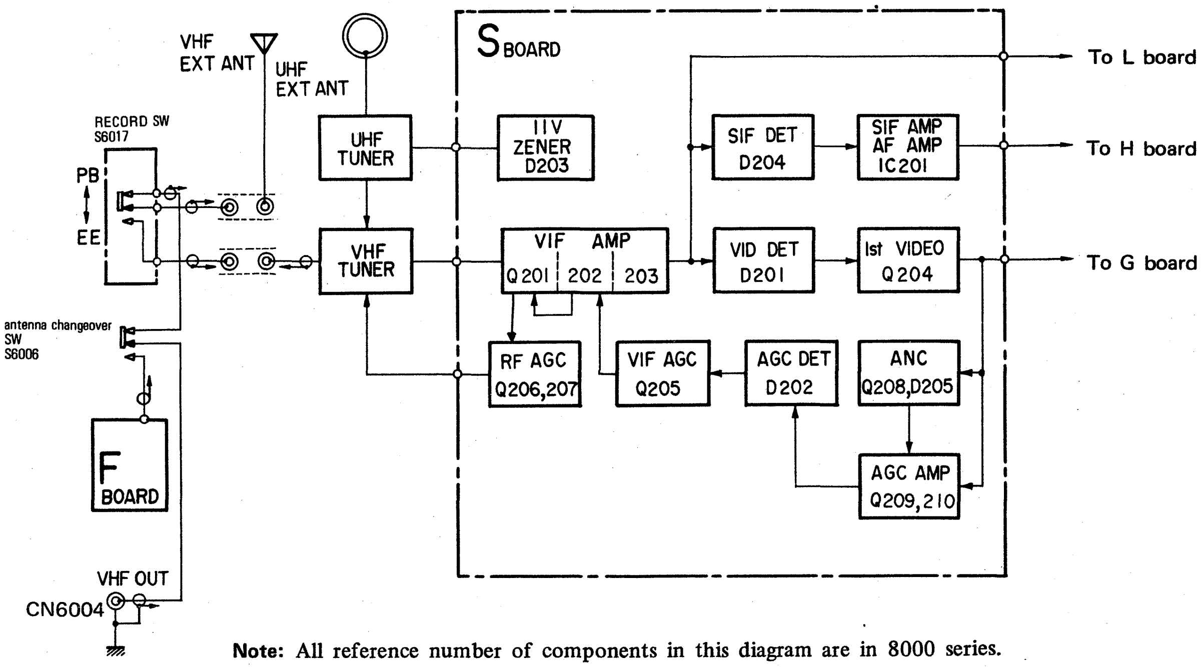
Note: All reference numbers of components in this diagram are in 1000 series.

11-8. BLOCK DIAGRAM – H Board and S Board –


H
LEFT AUDIO INPUT
PRE AMP Q 201, 203
BUFFER AMP Q 204
AGC/REC AMP Q 205, 206
REC AMP Q 207
LEFT REC OUT (TO "E" BOARD)
LEFT E-E OUT
A G C Q 202
MUTING Q 208
FROM S BOARD (AUDIO OUT)
TO INPUT SIGNAL SELECTOR
T501 TRANS
DETECTOR Q 209, 210, 308
A G C Q 302
MUTING Q 211
RIGHT E-E OUT
RIGHT AUDIO INPUT
PRE AMP Q 301, 303
BUFFER AMP Q 304
AGC/REC AMP Q 305, 306
REC AMP Q 307
RIGHT REC OUT (TO "E" BOARD)

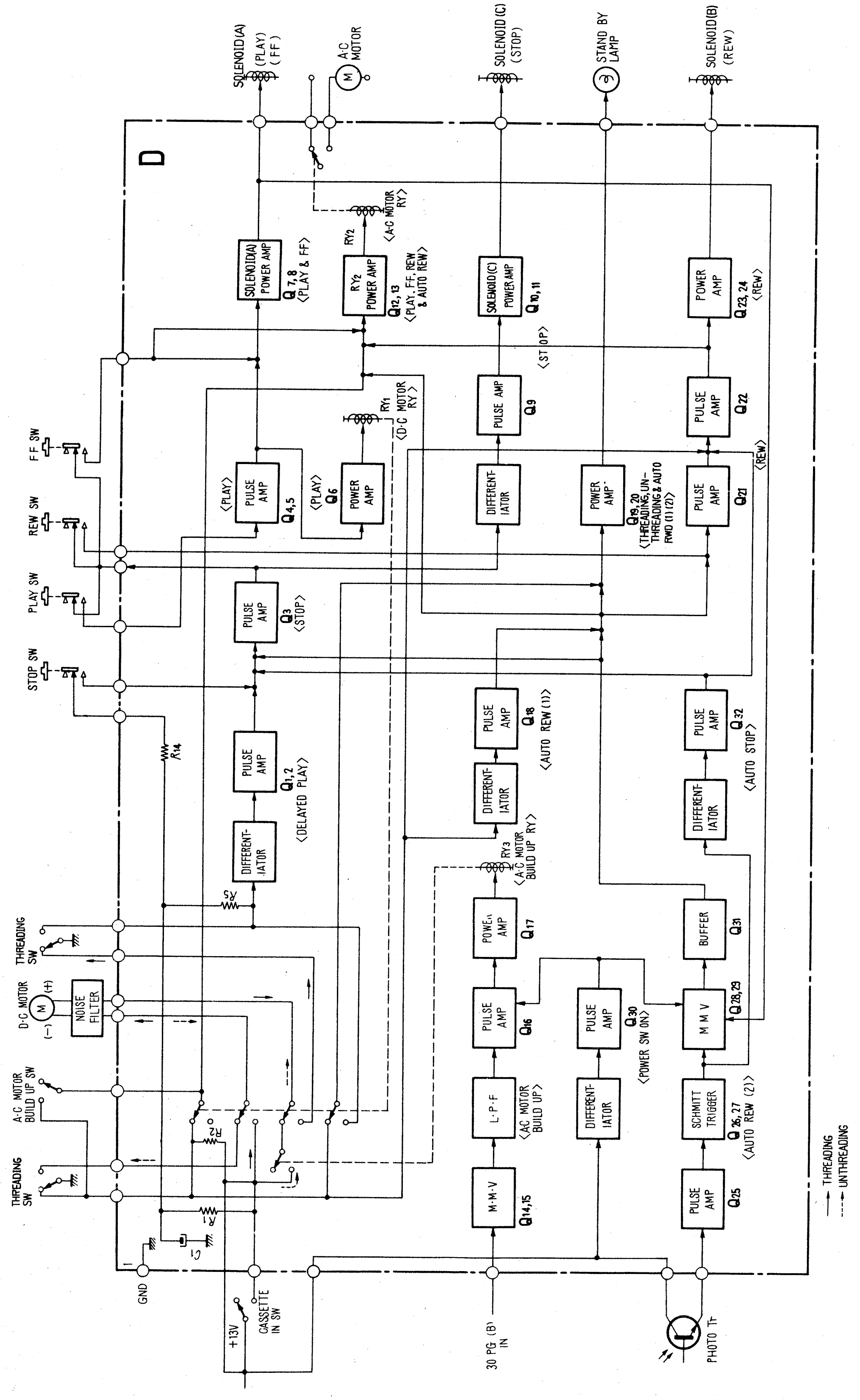
Note: All reference number of components in this diagram are in 2000 series.

– S Board –


VHF EXT ANT
UHF EXT ANT
RECORD SW S6017
PB
EE
antenna changeover SW S6006
F BOARD
VHF OUT
CN6004
UHF TUNER
VHF TUNER
S BOARD
11V ZENER D203
SIF DET D204
SIF AMP AF AMP IC201
VIF AMP Q201 202 203
VID DET D201
Ist VIDEO Q204
RF AGC Q206,207
VIF AGC Q205
AGC DET D202
ANC Q208,D205
AGC AMP Q209,210
To L board
To H board
To G board

Note: All reference number of components in this diagram are in 8000 series.

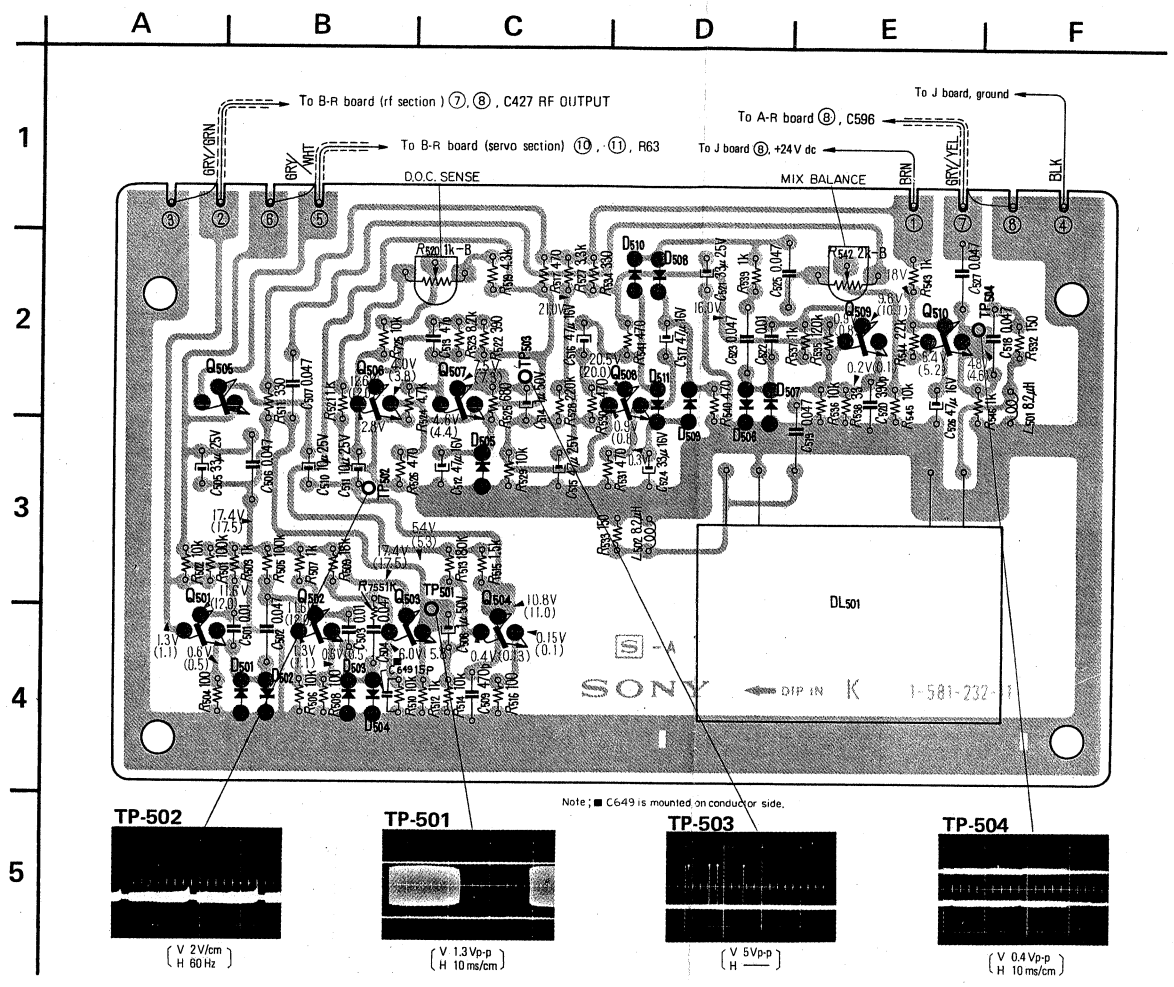
11-9. BLOCK DIAGRAM – D Board –

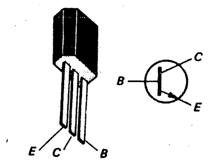

D
SOLENOID(A) (PLAY) (FF)
A-C MOTOR
SOLENOID(C) (STOP)
STAND BY LAMP
SOLENOID(B) (REW)
SOLENOID(A) POWER AMP
Q7, 8 ⟨PLAY & FF⟩
RY2 POWER AMP
Q12, 13 ⟨PLAY, FF, REW & AUTO REW⟩
RY2 ⟨A-C MOTOR RY⟩
SOLENOID(C) POWER AMP
Q10, 11
⟨STOP⟩
POWER AMP
Q23, 24 ⟨REW⟩
RY1 ⟨D-C MOTOR RY⟩
PULSE AMP Q9
PULSE AMP Q22
FF SW
REW SW
PLAY SW
STOP SW
PULSE AMP Q4, 5 ⟨PLAY⟩
POWER AMP Q6 ⟨PLAY⟩
DIFFERENTIATOR
POWER AMP Q19, 20 ⟨THREADING, UNTHREADING & AUTO RWD (1)(2)⟩
PULSE AMP Q21 ⟨REW⟩
PULSE AMP Q3 ⟨STOP⟩
PULSE AMP Q18 ⟨AUTO REW (1)⟩
PULSE AMP Q32 ⟨AUTO STOP⟩
PULSE AMP Q1, 2 ⟨DELAYED PLAY⟩
DIFFERENTIATOR
DIFFERENTIATOR
DIFFERENTIATOR
R14
RY3 ⟨A-C MOTOR BUILD UP RY⟩
S2
POWER AMP Q17
BUFFER Q31
THREADING SW
D-C MOTOR (+) (–)
NOISE FILTER
PULSE AMP Q16
PULSE AMP Q30 ⟨POWER SW ON⟩
M M V Q28, 29
A-C MOTOR BUILD UP SW
L·P·F ⟨AC MOTOR BUILD UP⟩
DIFFERENTIATOR
SCHMITT TRIGGER Q26, 27 ⟨AUTO REW (2)⟩
THREADING SW
M·M·V Q14, 15
PULSE AMP Q25
R1
R2
C1
GND
+13V
CASSETTE IN SW
30 PG (B) IN
PHOTO Tr
→ THREADING
--→ UNTHREADING

Note: All reference numbers of components in this diagram are in 4000 series.

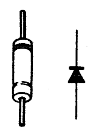
11-10. MOUNTING DIAGRAM

– K Board –

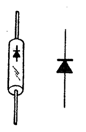

A
B
C
D
E
F
1
2
3
4
5
To B-R board (rf section) ⑦, ⑧, C427 RF OUTPUT
To B-R board (servo section) ⑩, ⑪, R63
To J board, ground
To A-R board ⑧, C596
To J board ⑥, +24V dc
GRY/BRN
GRY/WHT
D.O.C. SENSE
MIX BALANCE
BRN
GRY/YEL
BLK
DL501
SONY
DIP IN K
1-581-232
Note ; ■ C649 is mounted on conductor side.
TP-502
TP-501
TP-503
TP-504
V 2V/cm H 60Hz
V 1.3Vp-p H 10ms/cm
V 5Vp-p H —
V 0.4Vp-p H 10ms/cm



2SC634A
2SC403B



1S2144A



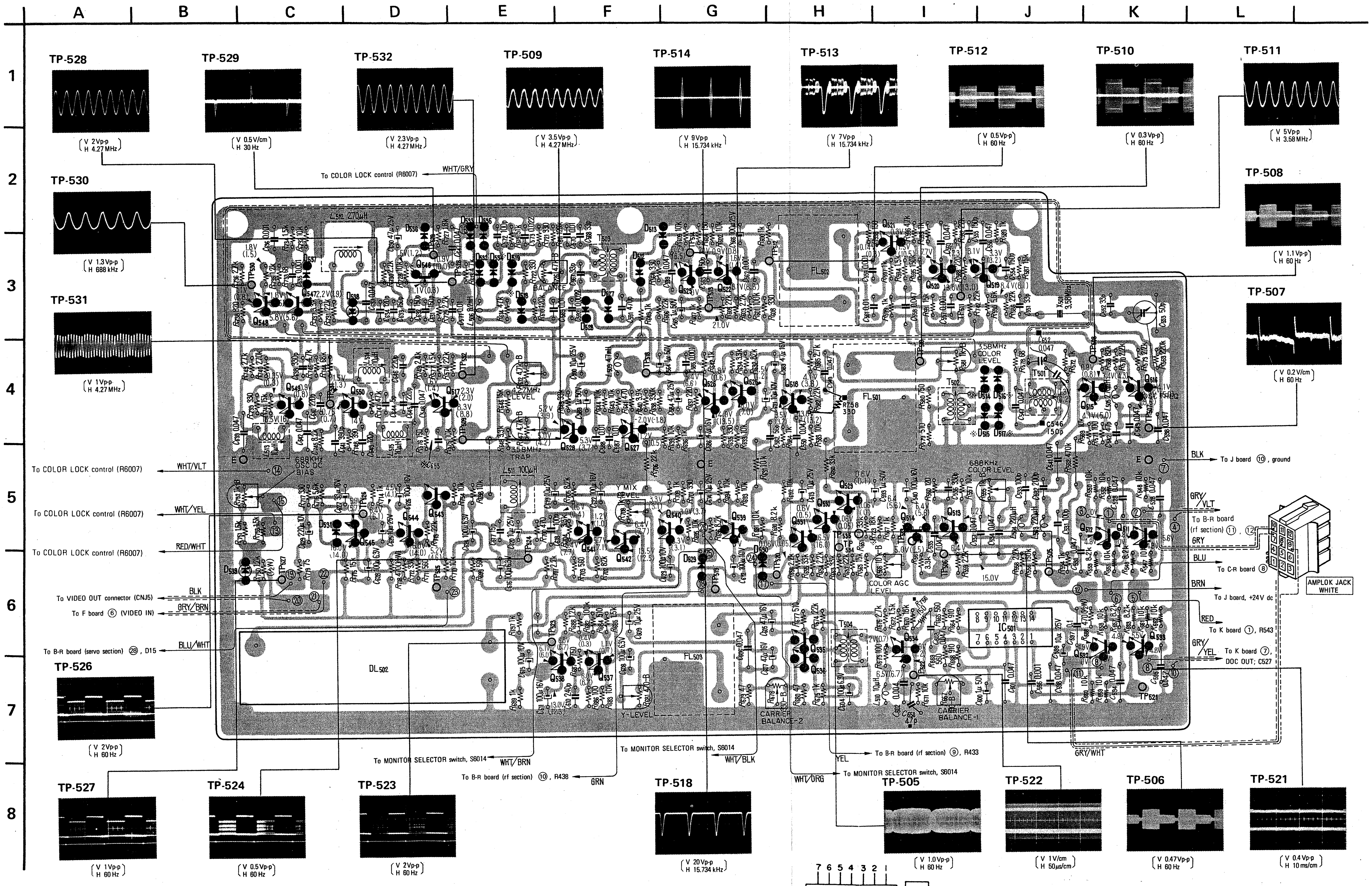
RD13A

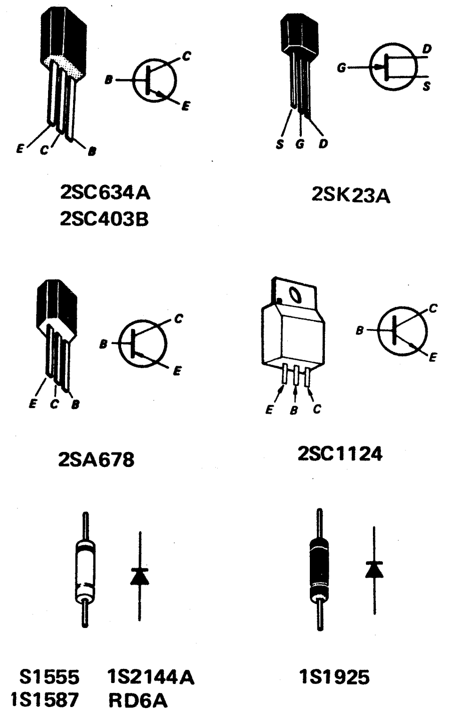
Note: All reference numbers of components or test points in this diagram are in 1000 series.

D501 D502 D503 D504	1S2144A	Q501 Q502 Q503 Q504	2SC403B
D505	RD13A	Q505	2SC403B
D506 D507 D508 D509 D510 D511	1S2144A	Q506 Q507 Q508	2SC634A
		Q509 Q510	2SC403B

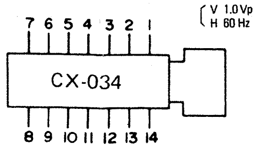
11-11. MOUNTING DIAGRAM

— A-R Board —


A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
7
8
TP-528 V 2Vp-p H 4.27MHz
TP-529 V 0.5V/cm H 30Hz
TP-532 V 2.3Vp-p H 4.27MHz
TP-509 V 3.5Vp-p H 4.27MHz
TP-514 V 9Vpp H 15.734kHz
TP-513 V 7Vp-p H 15.734kHz
TP-512 V 0.5Vp-p H 60Hz
TP-510 V 0.3Vp-p H 60Hz
TP-511 V 5Vp-p H 3.58MHz
TP-530 V 1.3Vp-p H 688kHz
TP-531 V 1Vp-p H 4.27MHz
TP-508 V 1.1Vp-p H 60Hz
TP-507 V 0.2V/cm H 60Hz
TP-526 V 2Vp-p H 60Hz
TP-527 V 1Vp-p H 60Hz
TP-524 V 0.5Vp-p H 60Hz
TP-523 V 2Vp-p H 60Hz
TP-518 V 20Vp-p H 15.734kHz
TP-505 V 1.0Vp-p H 60Hz
TP-522 V 1V/cm H 50µs/cm
TP-506 V 0.47Vp-p H 60Hz
TP-521 V 0.4Vp-p H 10ms/cm
To COLOR LOCK control (R6007) WHT/GRY
To COLOR LOCK control (R6007) WHT/VLT
To COLOR LOCK control (R6007) WHT/YEL
To COLOR LOCK control (R6007) RED/WHT
To VIDEO OUT connector (CNJ5) BLK
To F board ⑥ (VIDEO IN) GRY/BRN
To B-R board (servo section) ㉘, D15 BLU/WHT
To MONITOR SELECTOR switch, S6014 WHT/BRN
To B-R board (rf section) ⑩, R438 GRN
To MONITOR SELECTOR switch, S6014 WHT/BLK
YEL To B-R board (rf section) ⑨, R433
WHT/ORG To MONITOR SELECTOR switch, S6014
GRY/WHT
BLK To J board ⑲, ground
GRY/VLT To B-R board (rf section) ⑪, ⑫
GRY
BLU To C-R board ⑧
BRN To J board, +24V dc
RED To K board ①, R543
GRY/YEL To K board ⑦, DOC OUT; C527
AMPLOK JACK WHITE
688KHz OSC DC BIAS
4.27MHz LEVEL
3.58MHz TRAP
BALANCE
Y MIX LEVEL
3.58MHz COLOR LEVEL
688KHz COLOR LEVEL
COLOR AGC LEVEL
CARRIER BALANCE-1
CARRIER BALANCE-2
Y-LEVEL
DL502
FL501
FL502
FL503
IC501
T501
T502
T504


2SC634A
2SC403B
2SK23A
2SA678
2SC1124
S1555
1S2144A
1S1587
RD6A
1S1925
E C B
S G D
B C E

Q511	2SC403B	Q545	2SC1124
Q512		Q546	2SK43
Q513		Q547	2SC403B
Q514	2SK23A	Q548	
Q515	2SC403B	Q549	
Q516		Q550	
Q517		D512	1S2144A
Q518		D513	1S2144A
Q519		D514	1S1587
Q520		D515	
Q521		D516	
Q522		D517	
Q523	2SA678	D518	1S1587
Q525	2SC403B	D519	
Q526		D527	1S2144A
Q527		D528	
Q528	2SA678	D529	1S1555
Q529	2SC634A	D530	
Q530		D531	1S2144A
Q531		D532	
Q532	2SC403B	D533	
Q533		D534	
Q534		D535	
Q535		D536	1S1925
Q536		D537	1S1555
Q537		D538	RD6A
Q538		D539	
Q539		IC501	CX-034
Q540			
Q541			
Q542			
Q543			
Q544			

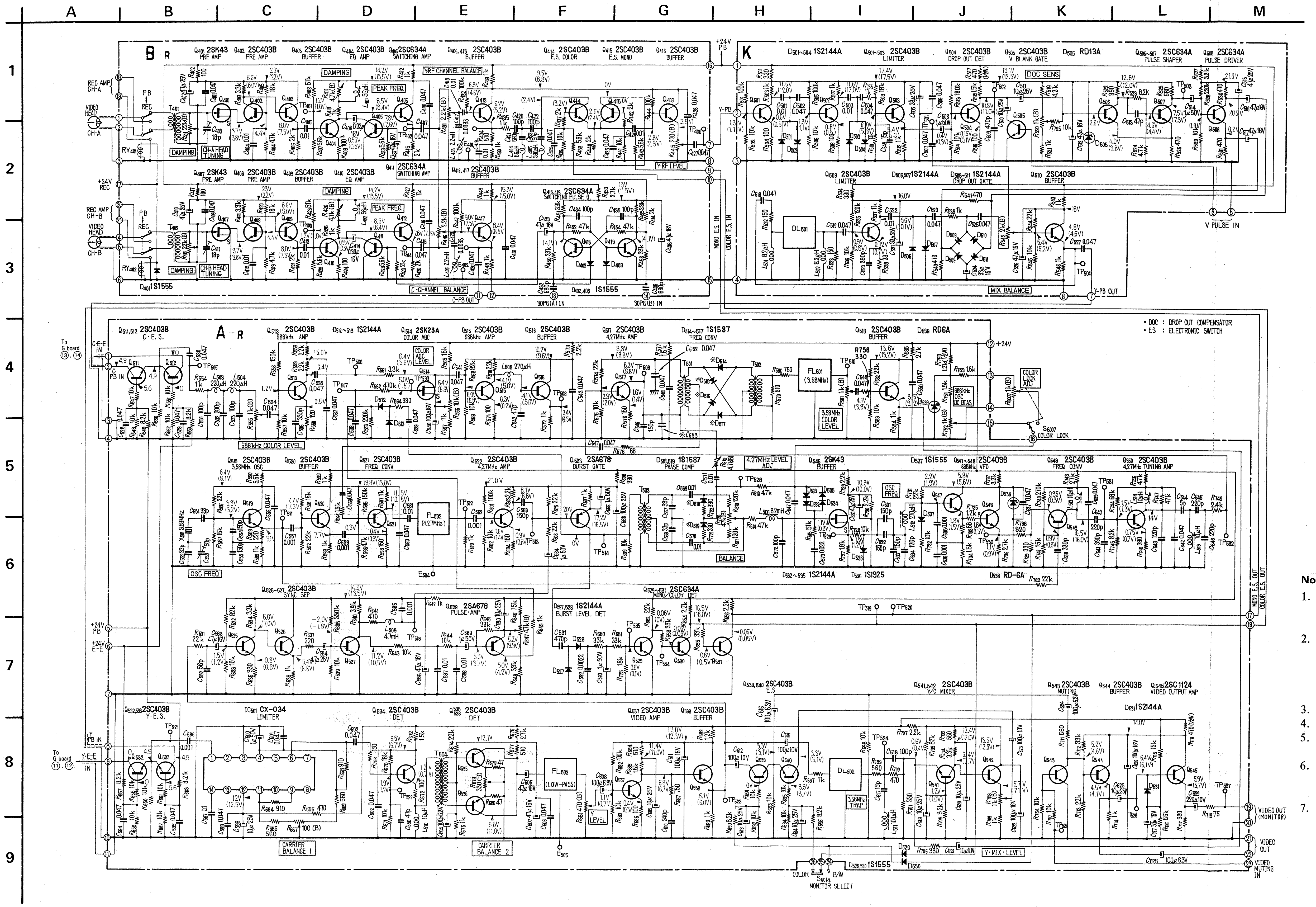

7 6 5 4 3 2 1
CX-034
8 9 10 11 12 13 14

(Top View)

Note: All reference numbers of components or test points in this diagram are in 1000 series.
- ■ R756, R758, C546, C548 and C650 are mounted on conductor side.
- ※ shoud be selected

11-12. SCHEMATIC DIAGRAM

– A-R, B-R (RF) and K Board –

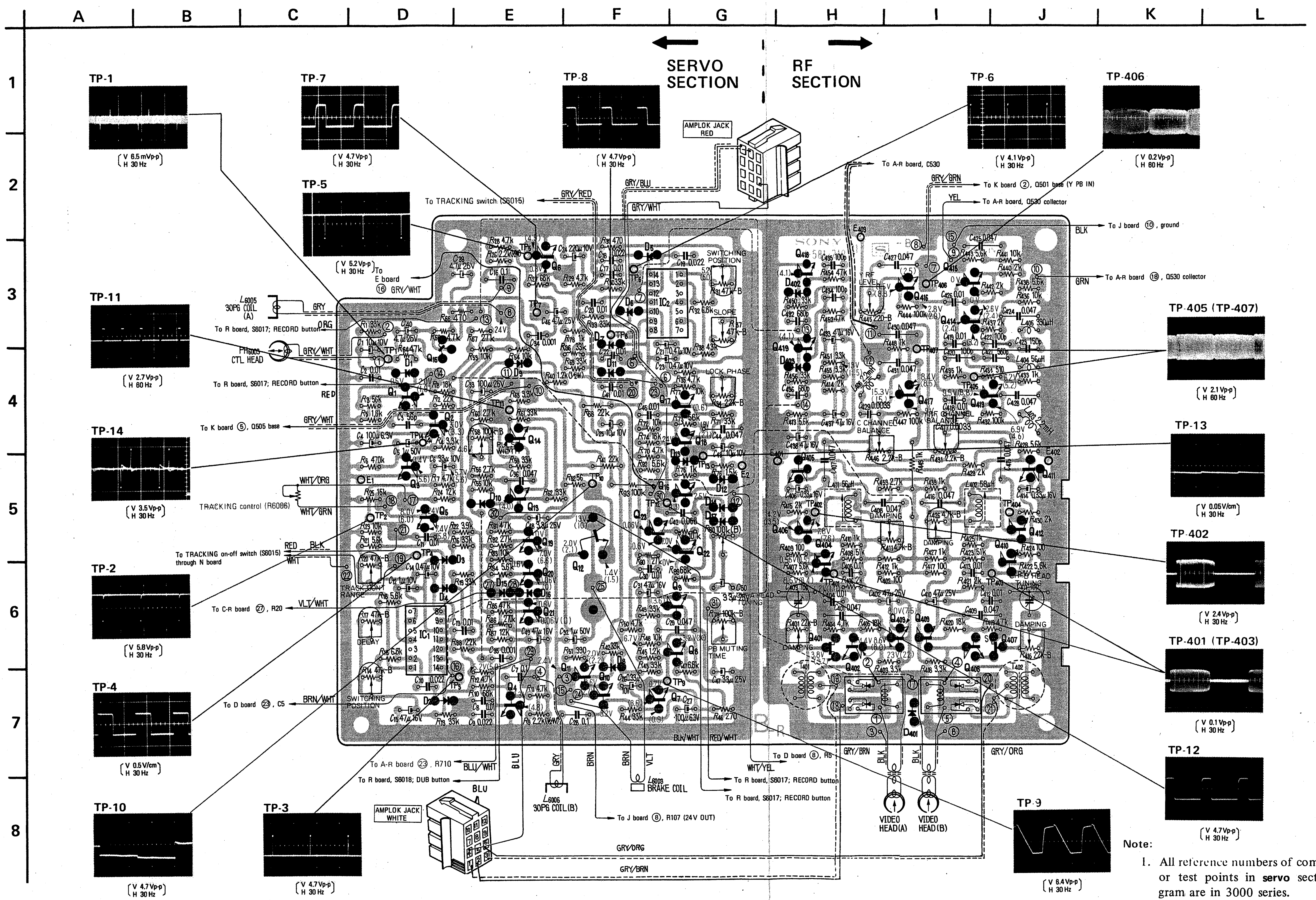

A
B
C
D
E
F
G
H
I
J
K
L
M
1
2
3
4
5
6
7
8
9
B R
K
A R
Q401 2SK43 PRE AMP
Q402 2SC403B PRE AMP
Q405 2SC403B BUFFER
Q404 2SC403B EQ AMP
Q406 2SC634A SWITCHING AMP
Q406, 413 2SC403B BUFFER
Q414 2SC403B E.S. COLOR
Q415 2SC403B E.S. MONO
Q416 2SC403B BUFFER
Q407 2SK43 PRE AMP
Q408 2SC403B PRE AMP
Q409 2SC403B BUFFER
Q410 2SC403B EQ AMP
Q411 2SC634A SWITCHING AMP
Q412, 417 2SC403B BUFFER
Q418, 419 2SC634A SWITCHING PULSE G.
D401 1S1555
D402, 403 1S1555
D501~504 1S2144A
Q501~503 2SC403B LIMITER
Q504 2SC403B DROP OUT DET
Q505 2SC403B V BLANK GATE
D505 RD13A
Q506~507 2SC634A PULSE SHAPER
Q508 2SC634A PULSE DRIVER
Q509 2SC403B LIMITER
D506, 507 1S2144A
D508~511 1S2144A DROP OUT GATE
Q510 2SC403B BUFFER
DL501
REC AMP CH-A
VIDEO HEAD CH-A
REC AMP CH-B
VIDEO HEAD CH-B
+24V REC
+24V P.B
PB
REC
RY401
RY402
DAMPING
CH-A HEAD TUNING
CH-B HEAD TUNING
PEAK FREQ
Y-RF CHANNEL BALANCE
Y-RF LEVEL
C-CHANNEL BALANCE
C-PB OUT
30PB(A) IN
30PG(B) IN
DOC SENS
MIX BALANCE
V PULSE IN
Y-PB OUT
Y-PB
MONO E.S. IN
COLOR E.S. IN
• DOC : DROP OUT COMPENSATOR
• ES : ELECTRONIC SWITCH
Q511, 512 2SC403B C-E.S.
Q513 2SC403B 688kHz AMP
D512~513 1S2144A
Q514 2SK23A COLOR ABC
Q515 2SC403B 688kHz AMP
Q516 2SC403B BUFFER
Q517 2SC403B 4.27MHz AMP
D514~517 1S1587 FREQ CONV
Q518 2SC403B BUFFER
D519 RD6A
FL501 (3.58MHz)
688kHz COLOR LEVEL
3.58MHz COLOR LEVEL
COLOR LOCK ADJ
S6007 COLOR LOCK
+24V
Q519 2SC403B 3.58MHz OSC
Q520 2SC403B BUFFER
Q521 2SC403B FREQ CONV
Q522 2SC403B 4.27MHz AMP
Q523 2SA678 BURST GATE
D518, 519 1S1587 PHASE COMP
4.27MHz LEVEL ADJ
Q546 2SK43 BUFFER
D537 1S1555
Q547~548 2SC403B 688kHz VCO
Q549 2SC403B FREQ CONV
Q550 2SC403B 4.27MHz TUNING AMP
FL502 (4.27MHz)
OSC FREQ
OSC FREQ
BALANCE
D532~535 1S2144A
D536 1S1925
D538 RD-6A
Q525~527 2SC403B SYNC SEP
Q528 2SA678 PULSE AMP
D527, 528 1S2144A BURST LEVEL DET
Q529~531 2SC634A MONO/COLOR DET
MONO E.S. OUT
COLOR E.S. OUT
To C board ⑬. ⑭
C-E-E IN
PB IN
Q532, 533 2SC403B Y-E.S.
IC501 CX-034 LIMITER
Q534 2SC403B DET
Q535 2SC403B DET
Q537 2SC403B VIDEO AMP
Q538 2SC403B BUFFER
Q539, 540 2SC403B E.S
Q541, 542 2SC403B Y/C MIXER
Q543 2SC403B MUTING
Q544 2SC403B BUFFER
Q545 2SC1124 VIDEO OUTPUT AMP
D531 1S2144A
FL503 (LOW-PASS)
DL502
3.58MHz TRAP
Y LEVEL
CARRIER BALANCE 1
CARRIER BALANCE 2
Y-MIX LEVEL
To G board ⑪. ⑫
Y-E-E IN
Y PB IN
D529, 530 1S1555
S6004 MONITOR SELECT
COLOR
B/W
VIDEO OUT (MONITOR)
VIDEO OUT
VIDEO MUTING IN

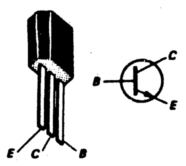
Note:

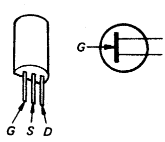
1. All reference numbers of components or test points in this diagram are in 1000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
   ( ) represents the dc voltage measured with a VOM (20 kΩ/V).
3. DOC means Dropout Compensator.
4. ES means Electronic Switch.
5. All resistance values are in ohms. k = 1,000, M = 1,000 k
6. All capacitance values are in μF except as indicated with p, which means μμF.
7. ＊ should be selected.

11-13. MOUNTING DIAGRAM

— B-R Board —

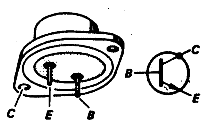

A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
7
8
SERVO SECTION
RF SECTION
TP-1
V 6.5mVp-p H 30Hz
TP-7
V 4.7Vp-p H 30Hz
TP-8
V 4.7Vp-p H 30Hz
TP-6
V 4.1Vp-p H 30Hz
TP-406
V 0.2Vp-p H 60Hz
TP-5
V 5.2Vp-p H 30Hz
TP-11
V 2.7Vp-p H 60Hz
TP-14
V 3.5Vp-p H 30Hz
TP-2
V 5.8Vp-p H 30Hz
TP-4
V 0.5V/cm H 30Hz
TP-10
V 4.7Vp-p H 30Hz
TP-3
V 4.7Vp-p H 30Hz
TP-9
V 6.4Vp-p H 30Hz
TP-405 (TP-407)
V 2.1Vp-p H 60Hz
TP-13
V 0.05V/cm H 30Hz
TP-402
V 2.4Vp-p H 30Hz
TP-401 (TP-403)
V 0.1Vp-p H 30Hz
TP-12
V 4.7Vp-p H 30Hz
AMPLOK JACK RED
AMPLOK JACK WHITE
To TRACKING switch (S6015)
To E board ⑯ GRY/WHT
L6005 30PG COIL (A)
To R board, S6017; RECORD button
PH6005 CTL HEAD
To K board ⑤, Q505 base
TRACKING control (R6086)
To TRACKING on-off switch (S6015) through N board
To C-R board ㉗, R20
To D board ㉘, C5
To A-R board ㉓, R710
To R board, S6018; DUB button
L6006 30PG COIL (B)
To J board ⑧, R107 (24V OUT)
L6003 BRAKE COIL
To D board ⑧, R6
To R board, S6017; RECORD button
To A-R board, C530
To K board ②, Q501 base (Y PB IN)
To A-R board, Q530 collector
To J board ⑩, ground
To A-R board ⑱, Q530 collector
VIDEO HEAD (A)
VIDEO HEAD (B)
GRY/RED
GRY/BLU
GRY/WHT
GRY/BRN
YEL
BLK
GRN
GRY
ORG
RED
WHT
WHT/ORG
WHT/BRN
VLT/WHT
BRN/WHT
BLU/WHT
BLU
BRN
VLT
BLK/WHT
RED/WHT
WHT/YEL
GRY/ORG
SWITCHING POSITION
SLOPE
LOCK PHASE
PB MUTING TIME
DELAY
TRACKING RANGE
RF LEVEL
C CHANNEL BALANCE
DAMPING
HEAD TUNING
B-R

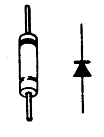




2SC634A
2SC403B

2SK43





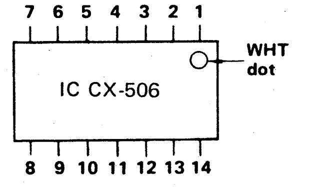
2SD291

1S1555
1T22

Q1	2SC634A	Q411	2SC634A
Q2		Q412	2SC403B
Q3		Q413	
Q4		Q414	
Q5		Q415	
Q6		Q416	
Q7		Q417	
Q8		Q418	2SC634A
Q9		Q419	
Q10			
Q11		D1	1T22
Q12	2SD291	D2	1S1555
Q13	2SC634A	D3	
Q14		D4	
Q15		D5	
Q16		D6	
Q17		D7	
Q18		D8	
Q19		D9	
Q20		D10	
Q21		D11	
Q22		D12	1T22
Q23		D13	1S1555
		D14	
Q401	2SK43	D15	
Q402	2SC403B	D16	
Q403		D17	
Q404			
Q405	2SC634A	D401	1S1555
Q406	2SC403B	D402	
Q407	2SK43	D403	
Q408	2SC403B		
Q409		IC1	CX-506
Q410		IC2	

Note:

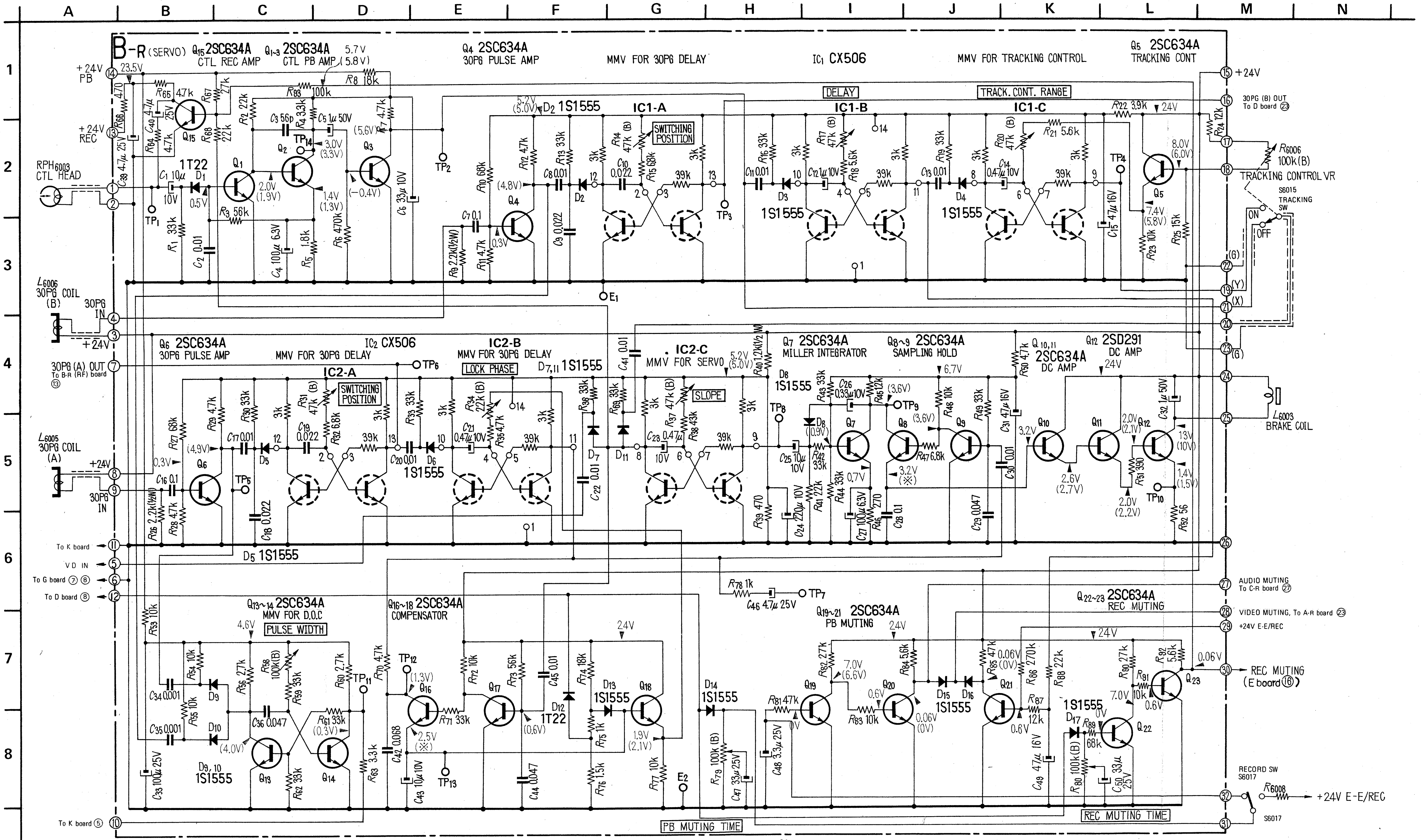
1. All reference numbers of components or test points in **servo** section diagram are in 3000 series.
2. All reference numbers of components or test points in **rf** section diagram are in 1000 series.


7 6 5 4 3 2 1
WHT dot
IC CX-506
8 9 10 11 12 13 14

(Top view)

11-14. MOUNTING DIAGRAM

– B-R (SERVO) Board –


A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
B-R (SERVO)
Q15 2SC634A CTL REC AMP
Q1~3 2SC634A CTL PB AMP
Q4 2SC634A 30PG PULSE AMP
MMV FOR 30PG DELAY
IC1 CX506
MMV FOR TRACKING CONTROL
Q5 2SC634A TRACKING CONT
DELAY
TRACK. CONT. RANGE
IC1-A
IC1-B
IC1-C
SWITCHING POSITION
D2 1S1555
D3 1S1555
D4 1S1555
+24V PB
+24V REC
RPH6003 CTL HEAD
1T22
TP1 TP2 TP3 TP4
E1
L6006 30PG COIL (B)
30PG IN
+24V
30PG (A) OUT To B-R (RF) board ⑬
L6005 30PG COIL (A)
30PG IN
Q6 2SC634A 30PG PULSE AMP
IC2 CX506 MMV FOR 30PG DELAY
IC2-A
IC2-B MMV FOR 30PG DELAY
LOCK PHASE
D7,11 1S1555
IC2-C MMV FOR SERVO
SLOPE
Q7 2SC634A MILLER INTEGRATOR
Q8~9 2SC634A SAMPLING HOLD
Q10,11 2SC634A DC AMP
Q12 2SD291 DC AMP
TP5 TP6 TP8 TP9 TP10
D5 1S1555
D6 1S1555
D8 1S1555
To K board
VD IN
To G board ⑦ ⑧
To D board ⑧
Q13~14 2SC634A MMV FOR D.O.C
PULSE WIDTH
Q16~18 2SC634A COMPENSATOR
D9,10 1S1555
D13 1S1555
D12 1T22
D14 1S1555
Q19~21 2SC634A PB MUTING
D15 D16 1S1555
D17 1S1555
Q22~23 2SC634A REC MUTING
TP7 TP11 TP12 TP13
E2
PB MUTING TIME
REC MUTING TIME
To K board ⑤
+24V
30PG (B) OUT To D board ㉓
R6006 100k(B) TRACKING CONTROL VR
S6015 TRACKING SW
ON OFF
L6003 BRAKE COIL
AUDIO MUTING To C-R board ㉗
VIDEO MUTING, To A-R board ㉓
+24V E-E/REC
REC MUTING (E board ⑯)
RECORD SW S6017
R6008
+24V E-E/REC
S6017

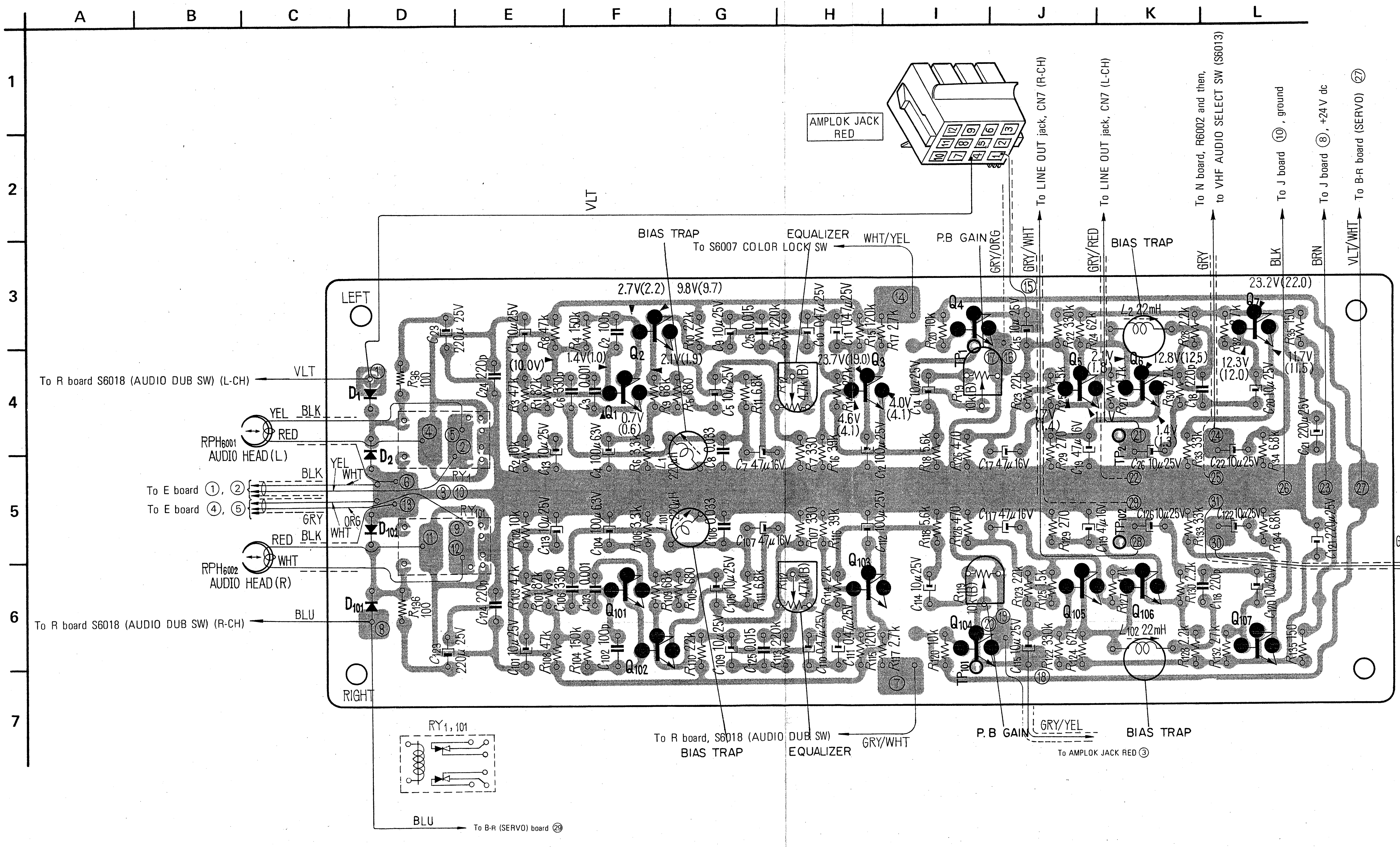
Note:

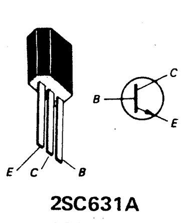
1. All reference numbers of components or test points in this diagram are in 3,000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
   ( ) represents the dc voltage measured with a VOM (20 kΩ/V).
3. All resistance values are in ohms. k = 1,000, M = 1,000 k
4. All capacitance values are in μF except as indicated with p, which means μμF.

11-15. MOUNTING DIAGRAM

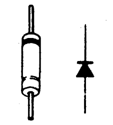
– C-R Board – (Serial No. up to 11,000)

Note: See Supplement 1 for Serial No. 11,001 and later.

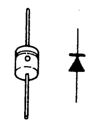

A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
7
AMPLOK JACK RED
VLT
BIAS TRAP
EQUALIZER
To S6007 COLOR LOCK SW
WHT/YEL
P.B GAIN
GRY/ORG
GRY/WHT
To LINE OUT jack, CN7 (R-CH)
GRY/RED
To LINE OUT jack, CN7 (L-CH)
BIAS TRAP
GRY
To N board, R6002 and then, to VHF AUDIO SELECT SW (S6013)
BLK
To J board ⑩, ground
BRN
To J board ⑧, +24 V dc
VLT/WHT
To B-R board (SERVO) ㉗
LEFT
RIGHT
2.7V(2.2)
9.8V(9.7)
23.2V(22.0)
(10.0V)
1.4V(1.0)
2.1V(1.9)
23.7V(19.0)
0.7V (0.6)
4.0V (4.1)
4.6V (4.1)
2.7V (1.8)
12.8V(12.5)
12.3V (12.0)
11.7V (11.5)
1.4V (1.3)
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q101
Q102
Q103
Q104
Q105
Q106
Q107
D1
D2
D101
D102
RY1
RY101
TP101
TP102
L2 22mH
L102 22mH
To R board S6018 (AUDIO DUB SW) (L-CH)
YEL
BLK
RED
RPH6001 AUDIO HEAD (L)
WHT
To E board ①, ②
To E board ④, ⑤
GRY
ORG
RPH6002 AUDIO HEAD (R)
To R board S6018 (AUDIO DUB SW) (R-CH)
BLU
GRY/GRN
To N board, R6004 and then, to VHF AUDIO SELECT SW (S6013)
To R board, S6018 (AUDIO DUB SW)
GRY/WHT
BIAS TRAP
EQUALIZER
P.B GAIN
GRY/YEL
BIAS TRAP
To AMPLOK JACK RED ③
RY1, 101
BLU
To B-R (SERVO) board ㉙



2SC631A
2SC634A



1S1555



10D-2

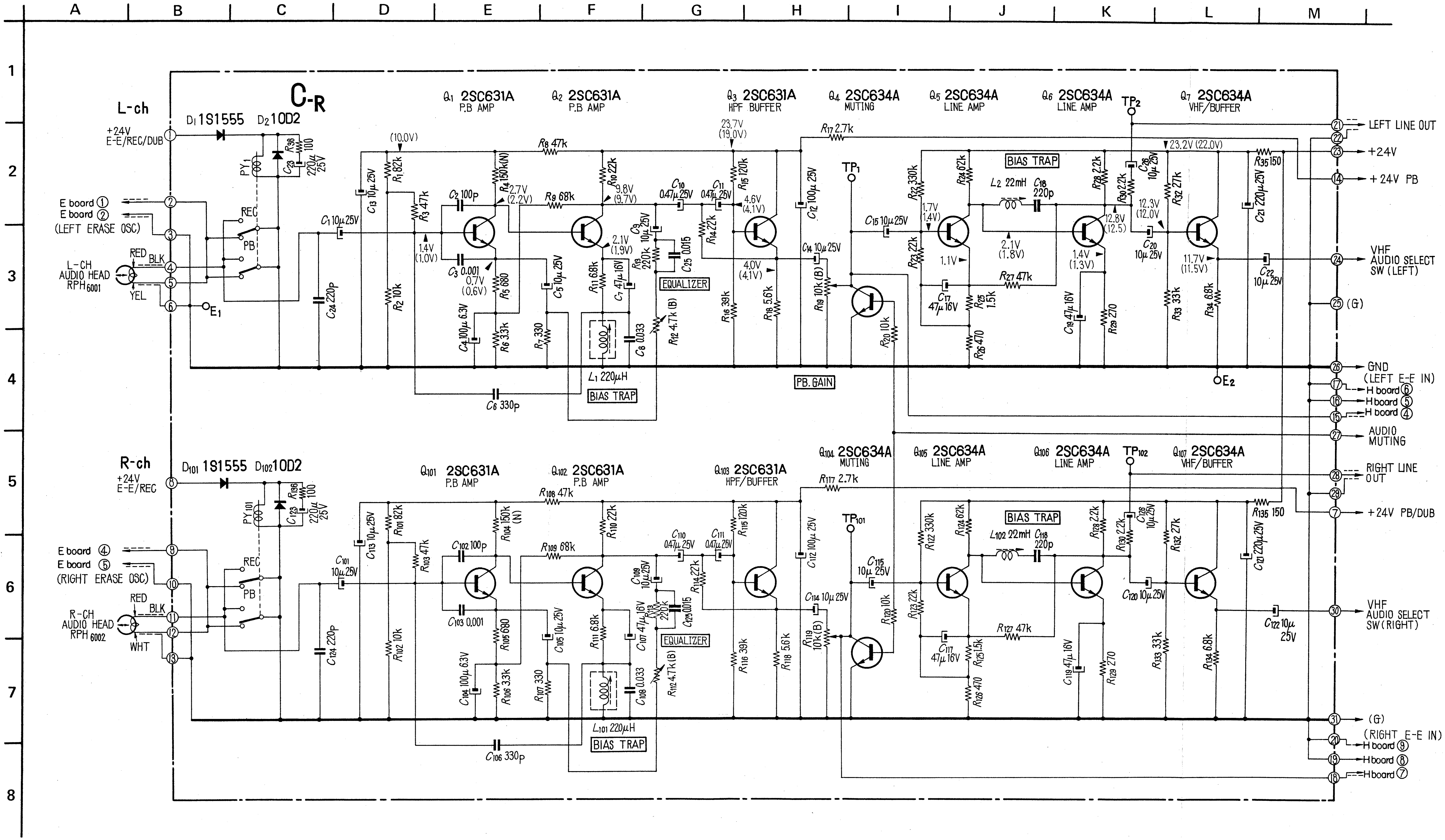
Q1 (Q101) Q2 (Q102) Q3 (Q103)	}	2SC631A
Q4 (Q104) Q5 (Q105) Q6 (Q106) Q7 (Q107)	}	2SC634A
D1 (D101)		1S1555
D2 (D102)		10D-2

Note: All reference numbers of components or test points in this diagram are in 2000 series.

11-16. SCHEMATIC DIAGRAM

— C-R Board — (Serial No. up to 11,000)

Note: See Supplement 1 for Serial No. 11,001 and later.

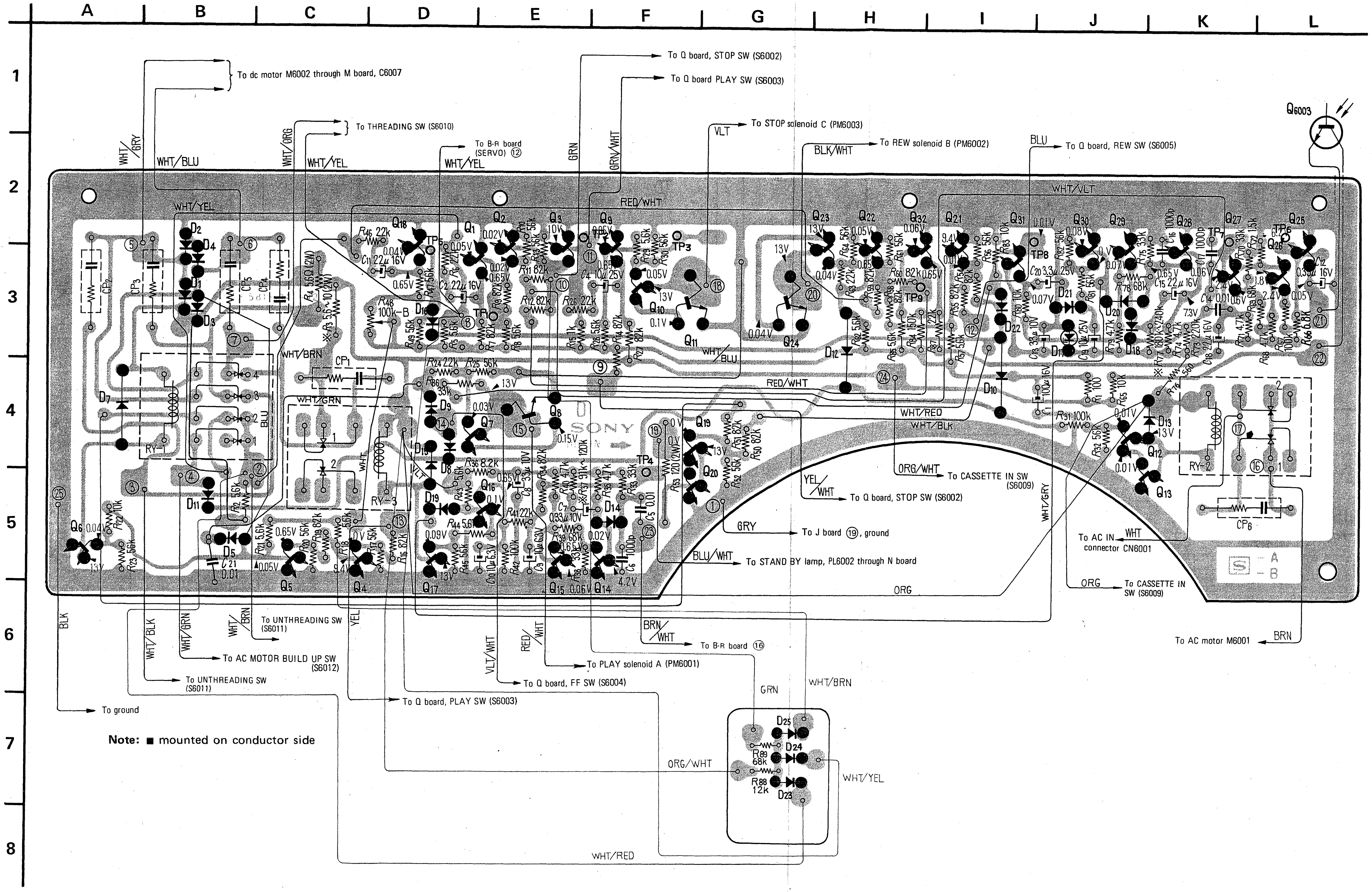

A
B
C
D
E
F
G
H
I
J
K
L
M
1
2
3
4
5
6
7
8
C-R
L-ch
+24V E-E/REC/DUB
D1 1S1555
D2 10D2
E board ①
E board ②
(LEFT ERASE OSC)
L-CH AUDIO HEAD RPH6001
RED
BLK
YEL
E1
REC
PB
PY1
R36 100
C23 220μ 25V
C1 10μ 25V
C24 220p
C3 10μ 25V
R1 82k
R2 10k
R3 47k
Q1 2SC631A P.B AMP
Q2 2SC631A P.B AMP
Q3 2SC631A HPF BUFFER
Q4 2SC634A MUTING
Q5 2SC634A LINE AMP
Q6 2SC634A LINE AMP
Q7 2SC634A VHF/BUFFER
TP2
TP1
(10.0V)
R8 47k
R4 150k(N)
2.7V (2.2V)
C2 100p
R9 68k
R10 22k
9.8V (9.7V)
1.4V (1.0V)
C3 0.001
0.7V (0.6V)
R5 680
C4 100μ 63V
R6 3.3k
R7 330
C5 10μ 25V
R11 6.8k
2.1V (1.9V)
C7 47μ 16V
C9 10μ 25V
R13 220k
C25 0.015
C10 0.47μ 25V
C11 0.47μ 25V
R15 120k
R14 22k
23.7V (19.0V)
4.6V (4.1V)
4.0V (4.1V)
EQUALIZER
R12 4.7k (B)
C8 0.033
L1 220μH
BIAS TRAP
C6 330p
R16 39k
R18 5.6k
R17 2.7k
C12 100μ 25V
C14 10μ 25V
R19 10k (B)
PB. GAIN
R20 10k
C15 10μ 25V
R22 330k
R23 22k
1.7V (1.4V)
1.1V
C17 47μ 16V
R24 62k
R25 1.5k
R26 470
L2 22mH
C18 220p
2.1V (1.8V)
R27 47k
1.4V (1.3V)
C19 47μ 16V
R29 270
R28 2.2k
R30 2.2k
C16 10μ 25V
12.8V (12.5)
12.3V (12.0V)
C20 10μ 25V
R32 27k
R33 3.3k
11.7V (11.5V)
R34 6.8k
23.2V (22.0V)
R35 150
C21 220μ 25V
C22 10μ 25V
E2
LEFT LINE OUT
+24V
+24V PB
VHF AUDIO SELECT SW (LEFT)
(G)
GND
(LEFT E-E IN)
H board ⑥
H board ⑤
H board ④
AUDIO MUTING
RIGHT LINE OUT
+24V PB/DUB
VHF AUDIO SELECT SW (RIGHT)
(G)
(RIGHT E-E IN)
H board ⑨
H board ⑧
H board ⑦
R-ch
+24V E-E/REC
D101 1S1555
D102 10D2
E board ④
E board ⑤
(RIGHT ERASE OSC)
R-CH AUDIO HEAD RPH6002
WHT
PY101
C123 220μ 25V
R136 100
C101 10μ 25V
C124 220p
C113 10μ 25V
R101 82k
R102 10k
R103 47k
Q101 2SC631A P.B AMP
Q102 2SC631A P.B AMP
Q103 2SC631A HPF/BUFFER
Q104 2SC634A MUTING
Q105 2SC634A LINE AMP
Q106 2SC634A LINE AMP
Q107 2SC634A VHF/BUFFER
TP102
TP101
R108 47k
R104 150k (N)
C102 100p
R109 68k
R110 22k
C103 0.001
R105 680
C104 100μ 63V
R106 3.3k
R107 330
C105 10μ 25V
R111 6.8k
C107 47μ 16V
C109 10μ 25V
R113 220k
C125 0.015
C110 0.47μ 25V
C111 0.47μ 25V
R115 120k
R114 22k
R112 4.7k (B)
C108 0.033
L101 220μH
C106 330p
R116 39k
R118 5.6k
R117 2.7k
C112 100μ 25V
C114 10μ 25V
R119 10k (B)
R120 10k
C115 10μ 25V
R122 330k
R123 22k
R124 62k
R125 1.5k
R126 470
C117 47μ 16V
L102 22mH
C118 220p
R127 47k
C119 47μ 16V
R129 270
R128 2.2k
R130 2.2k
C116 10μ 25V
C120 10μ 25V
R132 27k
R133 3.3k
R134 6.8k
R135 150
C121 220μ 25V
C122 10μ 25V

Note:

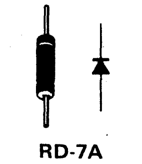
1. All reference numbers of components or test points in this diagram are in 2000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
   ( ) represents the dc voltage measured with a VOM (20 kΩ/V).
3. R-CH voltages are same as L-CH.

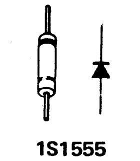
11-17. MOUNTING DIAGRAM
– D and Y Board – (Serial No. up to 10,400)

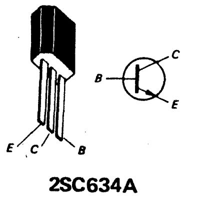
Note: See Supplement 1 for Serial No. 10,401 and later.

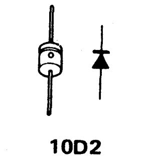

A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
7
8
To dc motor M6002 through M board, C6007
To THREADING SW (S6010)
To B-R board (SERVO) ⑫
To Q board, STOP SW (S6002)
To Q board PLAY SW (S6003)
To STOP solenoid C (PM6003)
To REW solenoid B (PM6002)
To Q board, REW SW (S6005)
Q6003
WHT/GRY
WHT/BLU
WHT/ORG
WHT/YEL
GRN
GRN/WHT
VLT
BLK/WHT
BLU
RED/WHT
WHT/VLT
WHT/BRN
WHT/GRN
WHT/RED
WHT/BLK
ORG/WHT
To CASSETTE IN SW (S6009)
YEL/WHT
To Q board, STOP SW (S6002)
GRY
To J board ⑲, ground
BLU/WHT
To STAND BY lamp, PL6002 through N board
ORG
To AC IN connector CN6001
To CASSETTE IN SW (S6009)
To AC motor M6001
BRN
BRN/WHT
To B-R board ⑯
BLK
WHT/BLK
WHT/GRN
WHT/BRN
To UNTHREADING SW (S6011)
YEL
VLT/WHT
RED/WHT
To AC MOTOR BUILD UP SW (S6012)
To UNTHREADING SW (S6011)
To PLAY solenoid A (PM6001)
To Q board, FF SW (S6004)
To Q board, PLAY SW (S6003)
To ground
GRN
WHT/BRN
WHT/YEL
WHT/RED
D25
D24
D23
R89 68k
R88 12k
CP1
CP2
CP3
CP4
CP5
CP6
RY-1
RY-2
RY-3
TP1
TP3
TP4
TP5
TP6
TP7
TP8
TP9
SONY
A
B

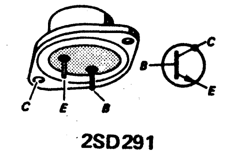
Note: ■ mounted on conductor side


RD-7A


1S1555


2SC634A


10D2


2SD291

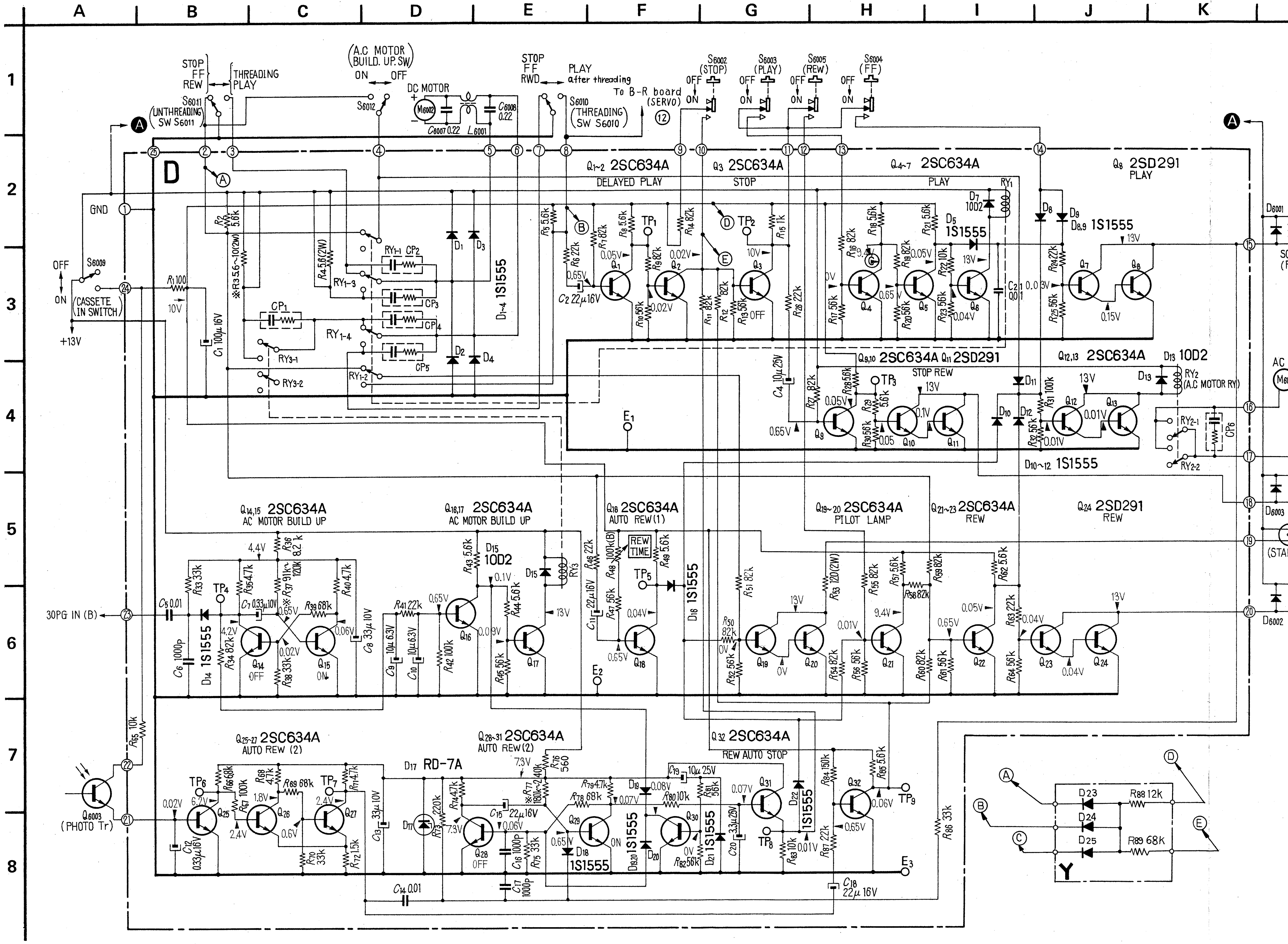
Q1	2SC634A
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	2SD291
Q9	2SC634A
Q10	
Q11	2SD291
Q12	2SC634A
Q13	
Q14	
Q15	
Q16	
Q17	
Q18	
Q19	
Q20	
Q21	
Q22	
Q23	
Q24	2SD291
Q25	2SC634A
Q26	
Q27	
Q28	
Q29	
Q30	
Q31	
Q32	

D1	1S1555
D2	
D3	
D4	
D5	
D7	10D-2
D8	1S1555
D9	
D10	
D11	
D12	
D13	10D-2
D14	1S1555
D15	10D-2
D16	1S1555
D17	RD-7A
D18	1S1555
D19	
D20	
D21	
D22	
D23	1S1555
D24	
D25	

Note: All reference numbers of components or test points in this diagram are in 4000 series.

11-18. SCHEMATIC DIAGRAM

– D and Y Board – (Serial No. up to 10,400) Note: See Supplement 1 for Serial No. 10,401 and later.

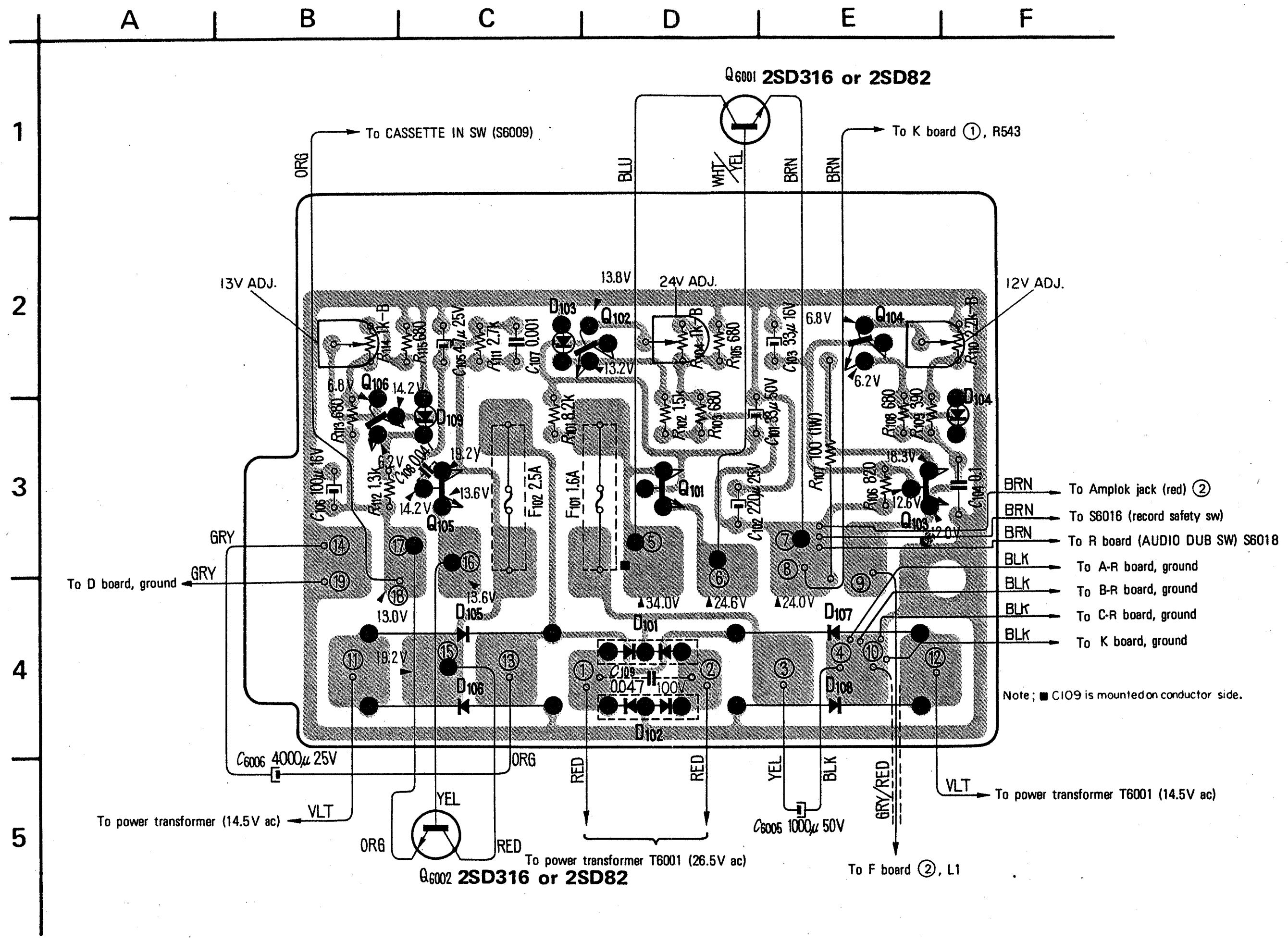

A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
6
7
8
STOP
FF
REW
THREADING
PLAY
S6011
(UNTHREADING SW S6011)
S6012
(A.C MOTOR BUILD. UP. SW)
ON
OFF
DC MOTOR
M6002
C6007 0.22
L6001
C6008 0.22
STOP
FF
RWD
PLAY after threading
S6010
(THREADING SW S6010)
To B-R board (SERVO)
S6002 (STOP)
S6003 (PLAY)
S6005 (REW)
S6004 (FF)
GND
OFF
ON
S6009
(CASSETE IN SWITCH)
+13V
D
Q1~2 2SC634A DELAYED PLAY
Q3 2SC634A STOP
Q4~7 2SC634A PLAY
Q8 2SD291 PLAY
D7 10D2
D8
D9
D8,9 1S1555
D5 1S1555
RY1
RY1-1 CP2
RY1-3
RY1-4
RY1-2
CP1
CP3
CP4
CP5
RY3-1
RY3-2
D1
D2
D3
D4
D1~4 1S1555
C1 100μ16V
C2 22μ16V
TP1
TP2
D6001
PM6001
SOLENOID A (PLAY FF)
Q9,10 2SC634A Q11 2SD291
STOP REW
TP3
Q12,13 2SC634A
D13 10D2
RY2 (A.C MOTOR RY)
AC MOTOR
M6001
RY2-1
RY2-2
C6
D10~12 1S1555
To terminal strip, 14-P
E1
C4 10μ25V
PM6003
SOLENOID C (STOP)
D6003
PL6002
(STAND BY LAMP)
PM6002
SOLENOID B (REW)
D6002
Q14,15 2SC634A AC MOTOR BUILD UP
Q16,17 2SC634A AC MOTOR BUILD UP
D15 10D2
RY3
Q18 2SC634A AUTO REW (1)
REW TIME
TP5
D16 1S1555
Q19~20 2SC634A PILOT LAMP
Q21~23 2SC634A REW
Q24 2SD291 REW
30PG IN (B)
C5 0.01
TP4
D14 1S1555
C6 1000p
C7 0.33μ10V
C8 33μ10V
C9 10μ6.3V
C10 10μ6.3V
E2
Q25~27 2SC634A AUTO REW (2)
Q28~31 2SC634A AUTO REW (2)
D17 RD-7A
Q32 2SC634A REW AUTO STOP
TP6
TP7
TP8
TP9
Q6003 (PHOTO Tr)
C12 0.33μ16V
C13 33μ10V
C14 0.01
C15 22μ16V
C16 1000p
C17 1000p
C18 22μ16V
C19 10μ25V
C20 3.3μ25V
D18 1S1555
D19,20 1S1555
D21 1S1555
D22 1S1555
E3
R86 33k
D23
D24
D25
R88 12k
R89 68k
Y

Note:

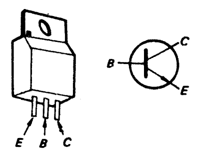
1. All reference numbers of components or test points in this diagram are in 4000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
3. All resistance values are in ohms. k = 1,000, M = 1,000 k
4. All capacitance values are in μF except as indicated with p, which means μμF.

11-19. MOUNTING DIAGRAM

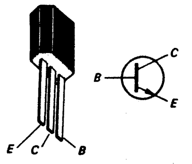
— J Board —


A
B
C
D
E
F
1
2
3
4
5
Q6001 2SD316 or 2SD82
To CASSETTE IN SW (S6009)
To K board ①, R543
ORG
BLU
WHT/YEL
BRN
BRN
13V ADJ.
13.8V
24V ADJ.
12V ADJ.
D103
Q102
Q104
Q106
Q101
Q103
Q105
D104
D109
F101 1.6A
F102 2.5A
BRN
BRN
BRN
BLK
BLK
BLK
BLK
To Amplok jack (red) ②
To S6016 (record safety sw)
To R board (AUDIO DUB SW) S6018
To A-R board, ground
To B-R board, ground
To C-R board, ground
To K board, ground
GRY
GRY
To D board, ground
34.0V
24.6V
24.0V
D107
D101
D102
D105
D106
D108
C109 0.047 100V
Note; ■ C109 is mounted on conductor side.
C6006 4000μ 25V
ORG
RED
RED
YEL
BLK
GRY/RED
VLT
To power transformer T6001 (14.5V ac)
To power transformer (14.5V ac)
VLT
YEL
ORG
RED
C6005 1000μ 50V
To power transformer T6001 (26.5V ac)
To F board ②, L1
Q6002 2SD316 or 2SD82

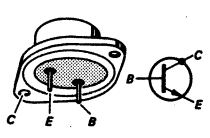
Note: All reference numbers of components or test points in this diagram are in 6000 series.



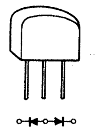
2SC1124



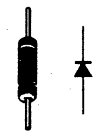
2SC633A



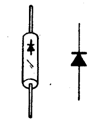
2SD316
2SD82



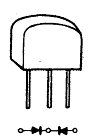
CDR-2



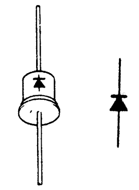
1S331



RD13A



CD-2

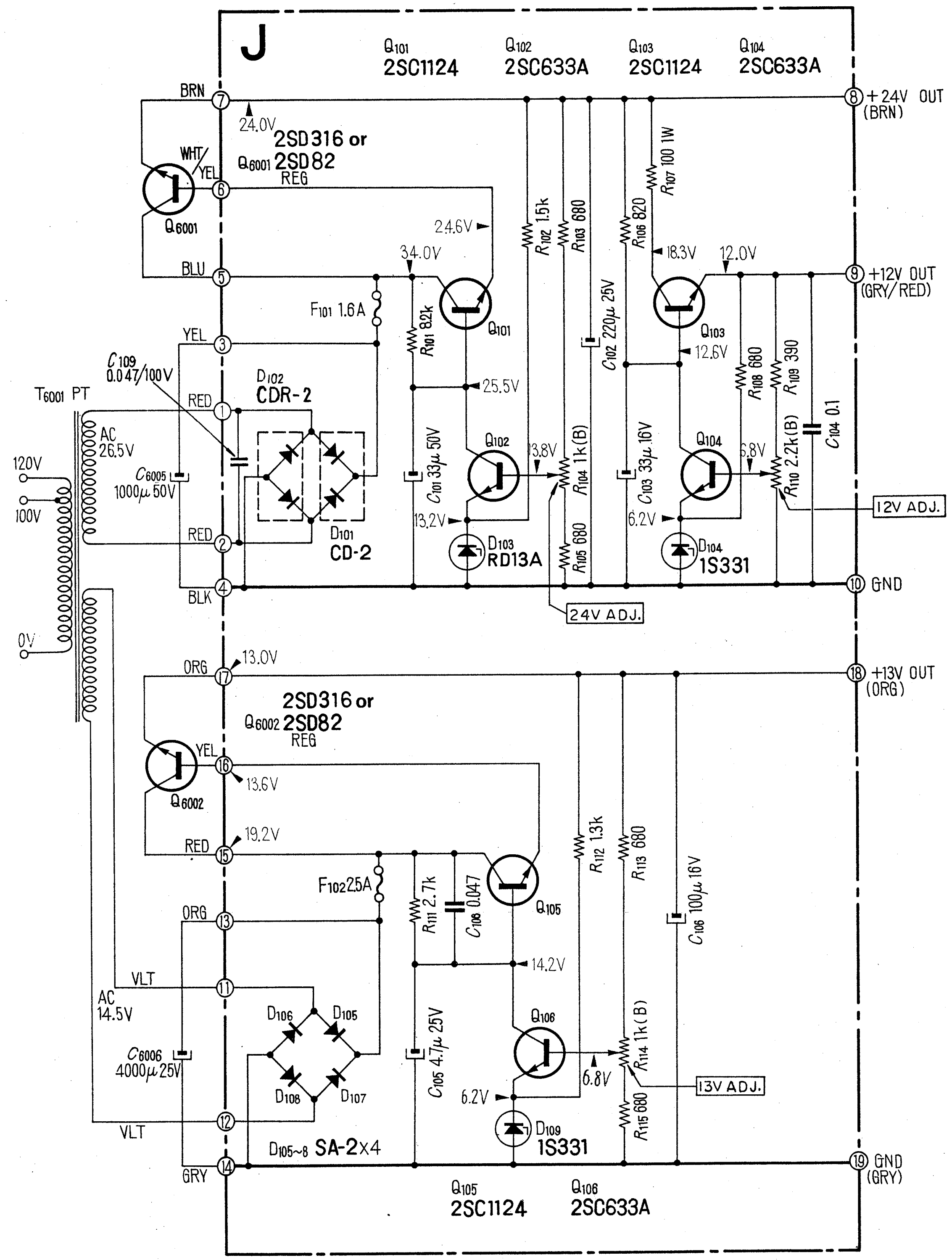


SA-2

D101	CD-2	Q6001	2SD82
D102	CDR-2	Q6002	
D103	RD-13A	Q101	2SC1124
D104	1S331	Q102	2SC633A
D105	SA-2	Q103	2SC1124
D106	SA-2	Q104	2SC633A
D107	SA-2	Q105	2SC1124
D108	SA-2	Q106	2SC633A
D109	1S331		

11-20. SCHEMATIC DIAGRAM

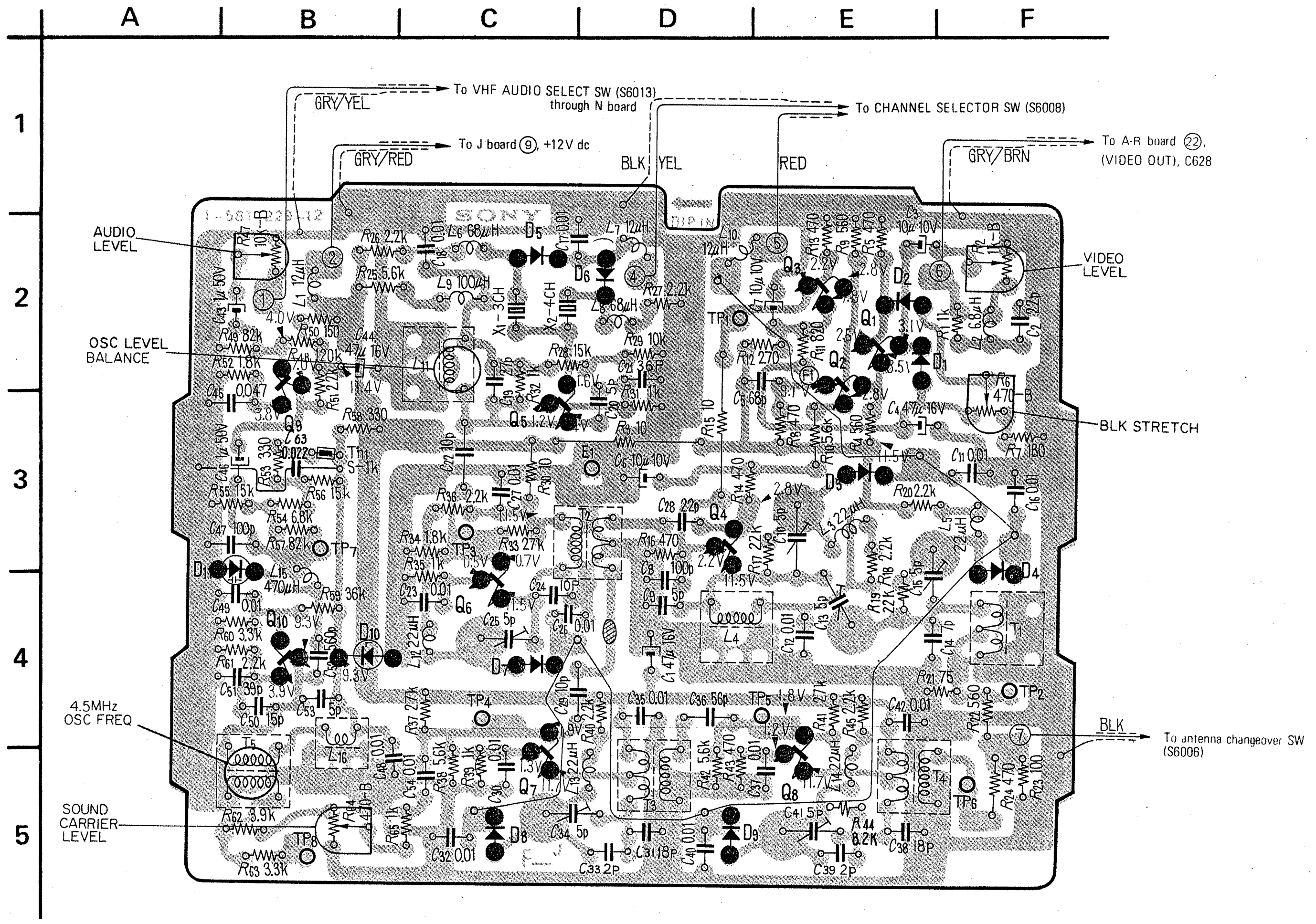
— J Board —

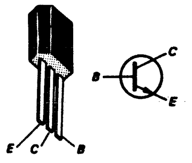

J
Q101 2SC1124
Q102 2SC633A
Q103 2SC1124
Q104 2SC633A
BRN
24.0V
2SD316 or
Q6001 2SD82
REG
WHT/YEL
Q6001
24.6V
34.0V
BLU
R102 1.5k
R103 680
R106 820
R107 100 1W
18.3V
12.0V
⑧ +24V OUT (BRN)
⑨ +12V OUT (GRY/RED)
F101 1.6A
R101 8.2k
YEL
C109 0.047/100V
D102 CDR-2
25.5V
C102 220μ 25V
12.6V
R108 680
R109 390
C104 0.1
T6001 PT
RED
AC 26.5V
C6005 1000μ 50V
120V
100V
0V
C101 33μ 50V
Q102
13.8V
R104 1k(B)
C103 33μ 16V
Q104
6.8V
R110 2.2k(B)
12V ADJ.
13.2V
6.2V
D101 CD-2
D103 RD13A
D104 1S331
R105 680
BLK
⑩ GND
24V ADJ.
ORG
13.0V
⑱ +13V OUT (ORG)
2SD316 or
Q6002 2SD82
REG
YEL
13.6V
Q6002
RED
19.2V
R112 1.3k
R113 680
C106 100μ 16V
F102 2.5A
R111 2.7k
C106 0.047
Q105
ORG
14.2V
VLT
AC 14.5V
D106
D105
C105 4.7μ 25V
Q106
R114 1k(B)
C6006 4000μ 25V
D108
D107
6.2V
6.8V
13V ADJ.
R115 680
D109 1S331
VLT
D105~8 SA-2×4
GRY
⑲ GND (GRY)
Q105 2SC1124
Q106 2SC633A

Note:

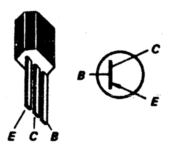
1. All reference numbers of components or test points in this diagram are in 6000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
3. All resistance values are in ohms. k = 1,000, M = 1,000 k
4. All capacitance values are in μF except as indicated with p, which means μμF.

11-21. MOUNTING DIAGRAM
– F Board –

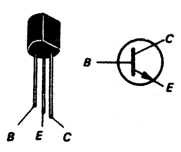

A
B
C
D
E
F
1
2
3
4
5
To VHF AUDIO SELECT SW (S6013) through N board
To CHANNEL SELECTOR SW (S6008)
GRY/YEL
To J board ⑨, +12V dc
GRY/RED
BLK
YEL
RED
GRY/BRN
To A-R board ㉒, (VIDEO OUT), C628
AUDIO LEVEL
VIDEO LEVEL
OSC LEVEL BALANCE
BLK STRETCH
4.5MHz OSC FREQ
SOUND CARRIER LEVEL
BLK
To antenna changeover SW (S6006)
SONY



2SC634A



2SA677



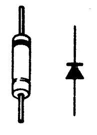
2SC1128

Note: All reference numbers of components or test points in this diagram are in 5000 series.

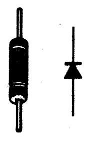
Q1	2SC634A	D1 D2	1T22A
Q2	2SA677		
Q3	2SC634A	D3	
Q4 Q5 Q6 Q7 Q8	2SC1128	D4 D5 D6 D7 D8 D9	1S1587
Q9 Q10	2SC634A		
		D10	RD-9A
		D11	1S353

CAUTION

Never attempt any repair work on F board except for semiconductors (except Q10, D10 and D11) and resistors. Send the unit to the Factory Service Center for a complete alignment or adjustment.

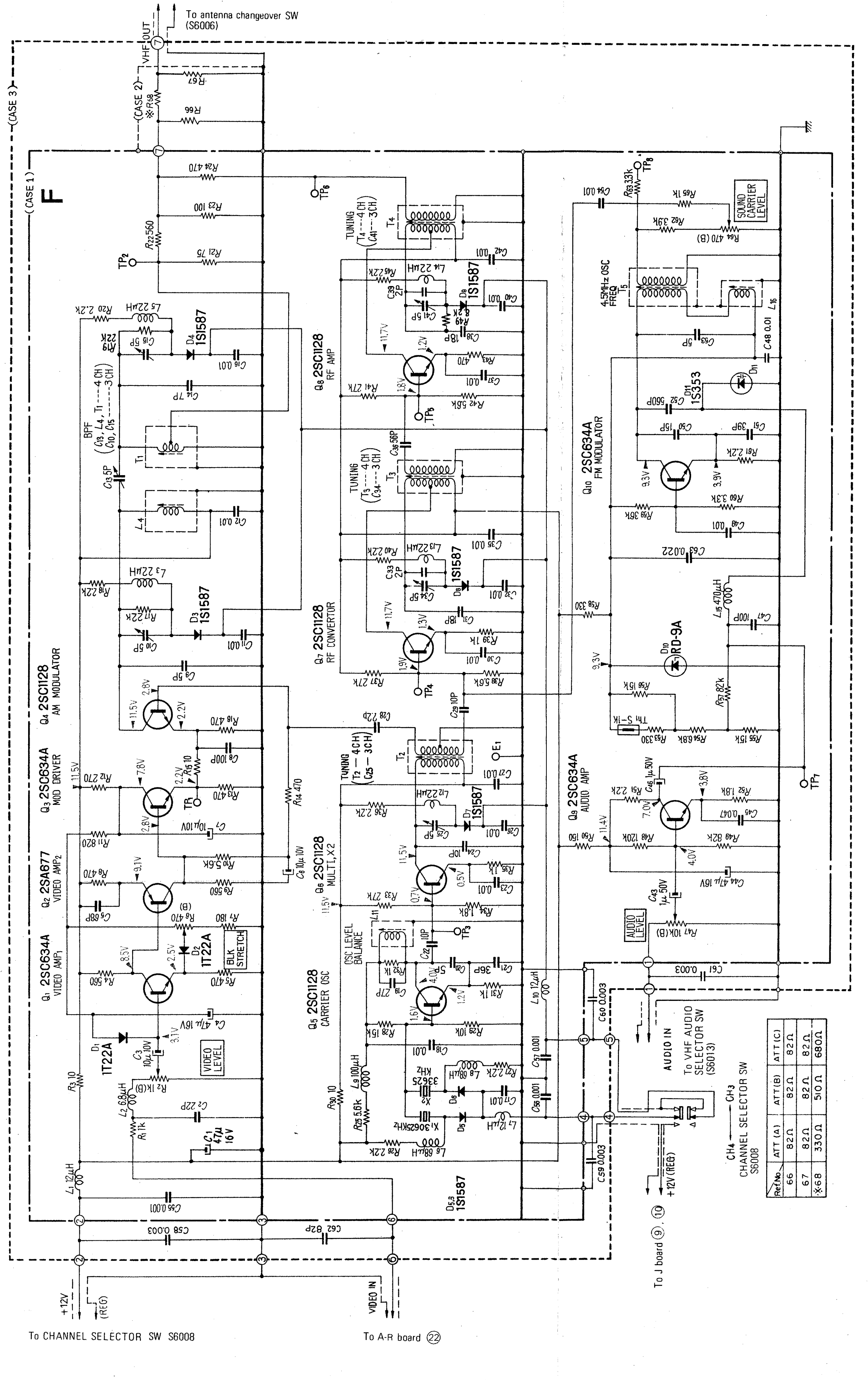


1T22A
1S1587
1S353



RD-9A

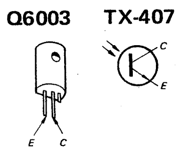
11-22. SCHEMATIC DIAGRAM – F Board –

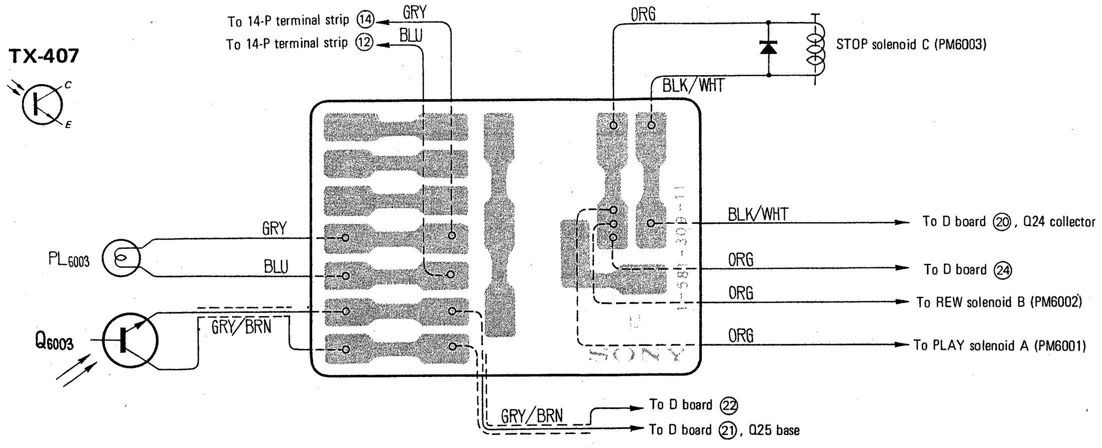

To antenna changeover SW (S6006)
VHF OUT
(CASE 3)
(CASE 2)
(CASE 1)
F
Q1 2SC634A VIDEO AMP1
Q2 2SA677 VIDEO AMP2
Q3 2SC634A MOD DRIVER
Q4 2SC1128 AM MODULATOR
Q5 2SC1128 CARRIER OSC
Q6 2SC1128 MULTI, X2
Q7 2SC1128 RF CONVERTOR
Q8 2SC1128 RF AMP
Q9 2SC634A AUDIO AMP
Q10 2SC634A FM MODULATOR
BPF
TUNING
OSC LEVEL BALANCE
BLK STRETCH
VIDEO LEVEL
AUDIO LEVEL
SOUND CARRIER LEVEL
4.5MHz OSC FREQ
AUDIO IN
To VHF AUDIO SELECTOR SW (S6013)
CH4 —— CH3
CHANNEL SELECTOR SW S6008
+12V (REG)
To J board ⑨, ⑩
VIDEO IN
To CHANNEL SELECTOR SW S6008
To A-R board ㉒

Ref.No	ATT (A)	ATT (B)	ATT (C)
66	82Ω	82Ω	82Ω
67	82Ω	82Ω	82Ω
※68	330Ω	510Ω	680Ω

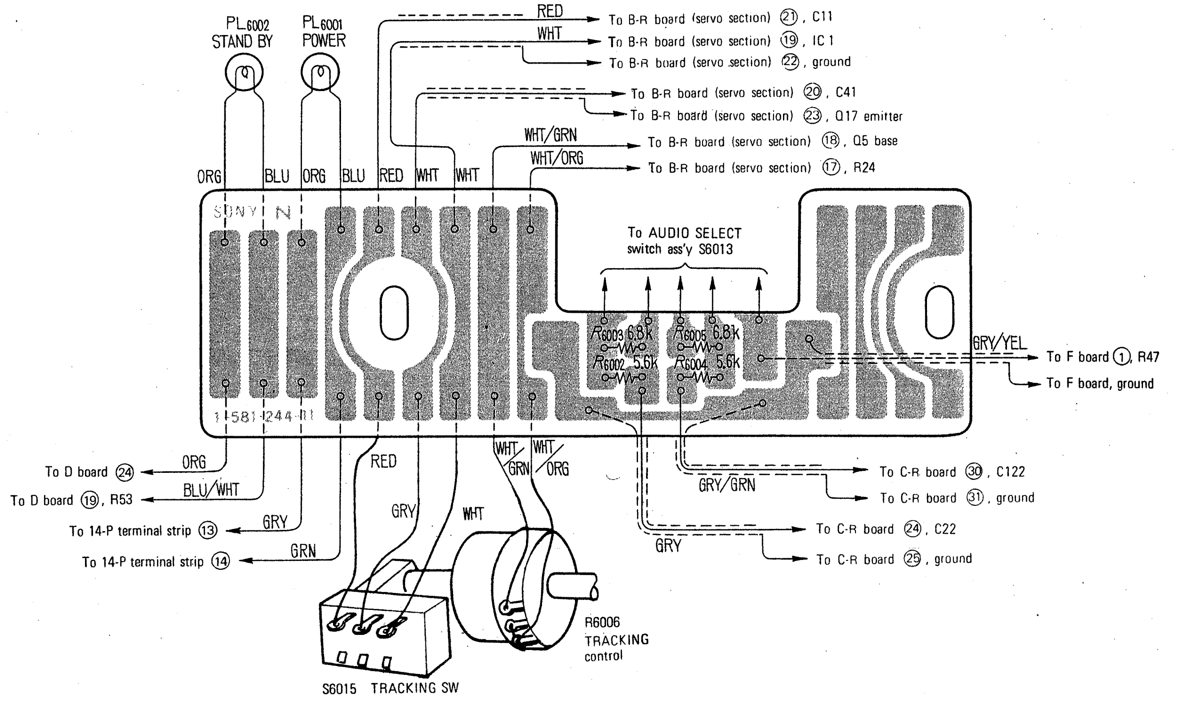
Note:
1. All reference numbers of components or test points in this diagram are in 5000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
3. All resistance values are in ohms. k = 1,000.
4. All capacitance values are in μF except as indicated with p, which means μμF.

11-23. MOUNTING DIAGRAM
– U, N and M Board –

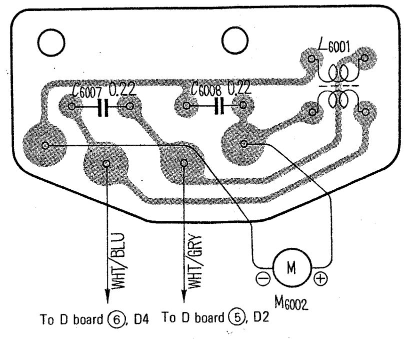

Q6003
TX-407
C
E
E C


To 14-P terminal strip ⑭
To 14-P terminal strip ⑫
GRY
BLU
ORG
STOP solenoid C (PM6003)
BLK/WHT
PL6003
Q6003
GRY/BRN
To D board ⑳, Q24 collector
To D board ㉔
To REW solenoid B (PM6002)
To PLAY solenoid A (PM6001)
To D board ㉒
To D board ㉑, Q25 base
SONY

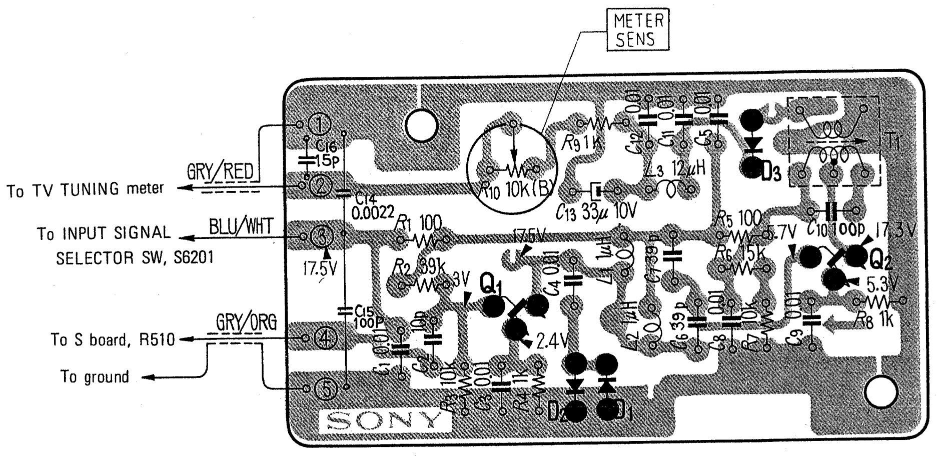
N Board (Serial No. up to 11,000) **Note:** See Supplement for Serial No. 11,001 and later.

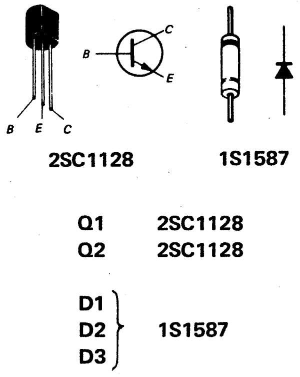

PL6002 STAND BY
PL6001 POWER
RED
WHT
To B-R board (servo section) ㉑, C11
To B-R board (servo section) ⑲, IC 1
To B-R board (servo section) ㉒, ground
To B-R board (servo section) ⑳, C41
To B-R board (servo section) ㉓, Q17 emitter
WHT/GRN
To B-R board (servo section) ⑱, Q5 base
WHT/ORG
To B-R board (servo section) ⑰, R24
ORG BLU ORG BLU RED WHT WHT
SONY N
To AUDIO SELECT switch ass'y S6013
R6003 6.5K
R6005 6.8K
R6002 5.6K
R6004 5.6K
GRY/YEL
To F board ①, R47
To F board, ground
To D board ㉔
To D board ⑲, R53
To 14-P terminal strip ⑬
To 14-P terminal strip ⑭
BLU/WHT
GRN
WHT/GRN
WHT/ORG
GRY/GRN
To C-R board ㉚, C122
To C-R board ㉛, ground
To C-R board ㉘, C22
To C-R board ㉙, ground
R6006 TRACKING control
S6015 TRACKING SW

M Board (Serial No. up to 11,240) **Note:** See Supplement 1 for Serial No. 11,241 and later.


L6001
C6007 0.22
C6008 0.22
WHT/BLU
WHT/GRY
M
M6002
To D board ⑥, D4
To D board ⑤, D2

11-24. MOUNTING DIAGRAM AND SCHEMATIC DIAGRAM
– L Board –


METER SENS
To TV TUNING meter
GRY/RED
To INPUT SIGNAL SELECTOR SW, S6201
BLU/WHT
To S board, R510
GRY/ORG
To ground
C16 15P
C14 0.0022
R1 100
R2 39K
R9 1K
R10 10K(B)
C13 33µ 10V
L3 12µH
R5 100
R6 15K
C10 100P
17.3V
5.3V
R8 1K
Q1
Q2
D1
D2
D3
T1
2.4V
17.5V
SONY

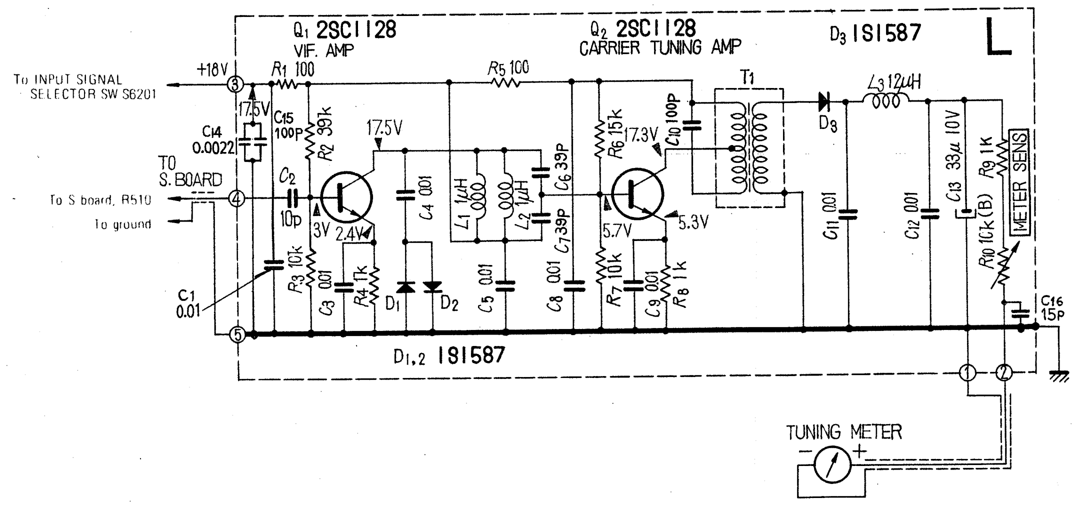

B
C
E
B E C
2SC1128
1S1587

Q1 2SC1128
Q2 2SC1128

D1, D2, D3 1S1587

Note: All reference numbers of component or test points in this diagram are in 7000 series.

– L Board –

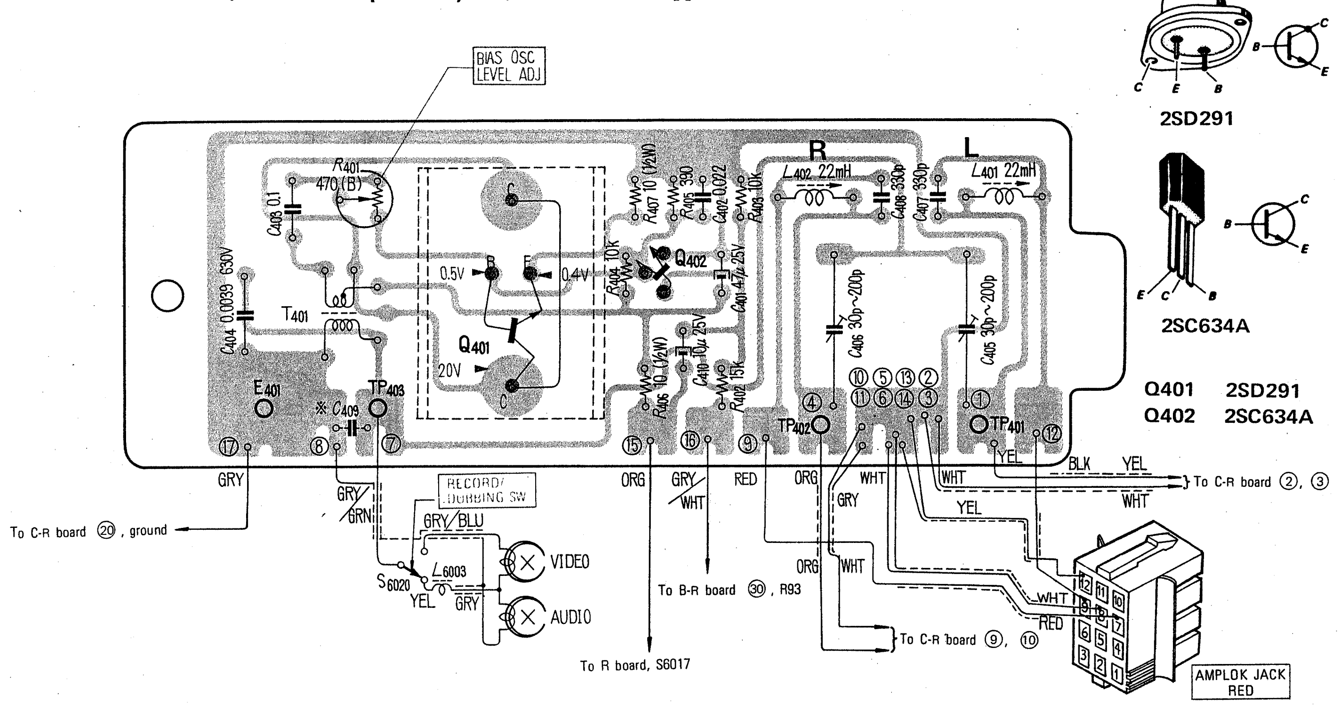

Q1 2SC1128 VIF. AMP
Q2 2SC1128 CARRIER TUNING AMP
D3 1S1587
L
To INPUT SIGNAL SELECTOR SW S6201
+18V
R1 100
17.5V
C14 0.0022
C15 100P
R2 39K
17.5V
TO S.BOARD
C2 10p
To S board, R510
To ground
3V 2.4V
C1 0.01
R3 10K
C3 0.01
R4 1K
D1
D2
C4 0.01
L1 1µH
L2 1µH
C6 39P
C7 39P
C5 0.01
C8 0.01
R5 100
R6 15K
17.3V
C10 100P
5.7V
5.3V
R7 10K
C9 0.01
R8 1K
T1
L3 12µH
C11 0.01
C12 0.01
C13 33µ 10V
R9 1K
R10 10K(B)
METER SENS
C16 15P
D1,2 1S1587
TUNING METER

Note:

1. All reference numbers of component in this diagram are in 7000 series.
2. All voltages are dc measured with a VOM (20 kΩ/V) and should hold within ±10%.
3. All resistance values are in ohms. K = 1,000,
4. All capacitance values are in µF except as indicated with p, which means µµF.

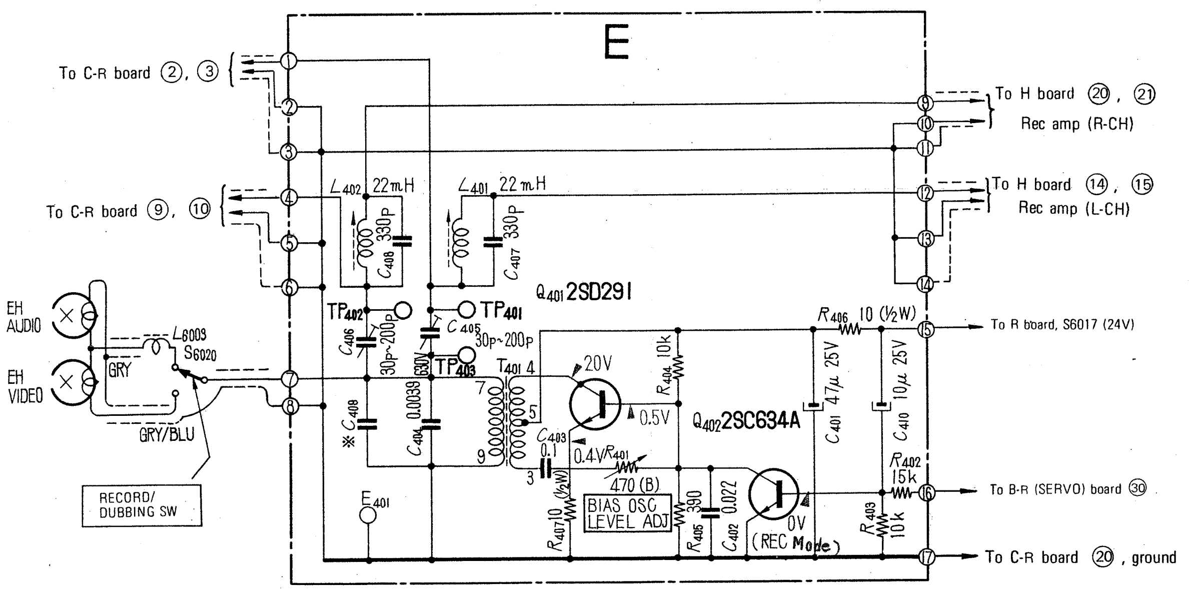
11-25. MOUNTING DIAGRAM AND SCHEMATIC DIAGRAM

— E Board — (Serial No. up to 19,100) **Note:** See Supplement 3 for Serial No. 19,101 and later.


BIAS OSC LEVEL ADJ
R
L
L402 22mH
L401 22mH
R401 470(B)
T401
Q401
Q402
E401
TP401
TP402
TP403
0.5V
0.4V
20V
2SD291
2SC634A
Q401 2SD291
Q402 2SC634A
C E B
GRY
ORG
RED
WHT
YEL
BLK
To C-R board ②, ③
To C-R board ⑳, ground
RECORD/ DUBBING SW
GRY/BLU
S6020
L6003
VIDEO
AUDIO
To B-R board ㉚, R93
To R board, S6017
To C-R board ⑨, ⑩
AMPLOK JACK RED

Note: All reference numbers of component or test points in this diagram are in 2000 series.

— E Board — (Serial No. up to 19,100) **Note:** See Supplement 3 for Serial No. 19,101 and later.

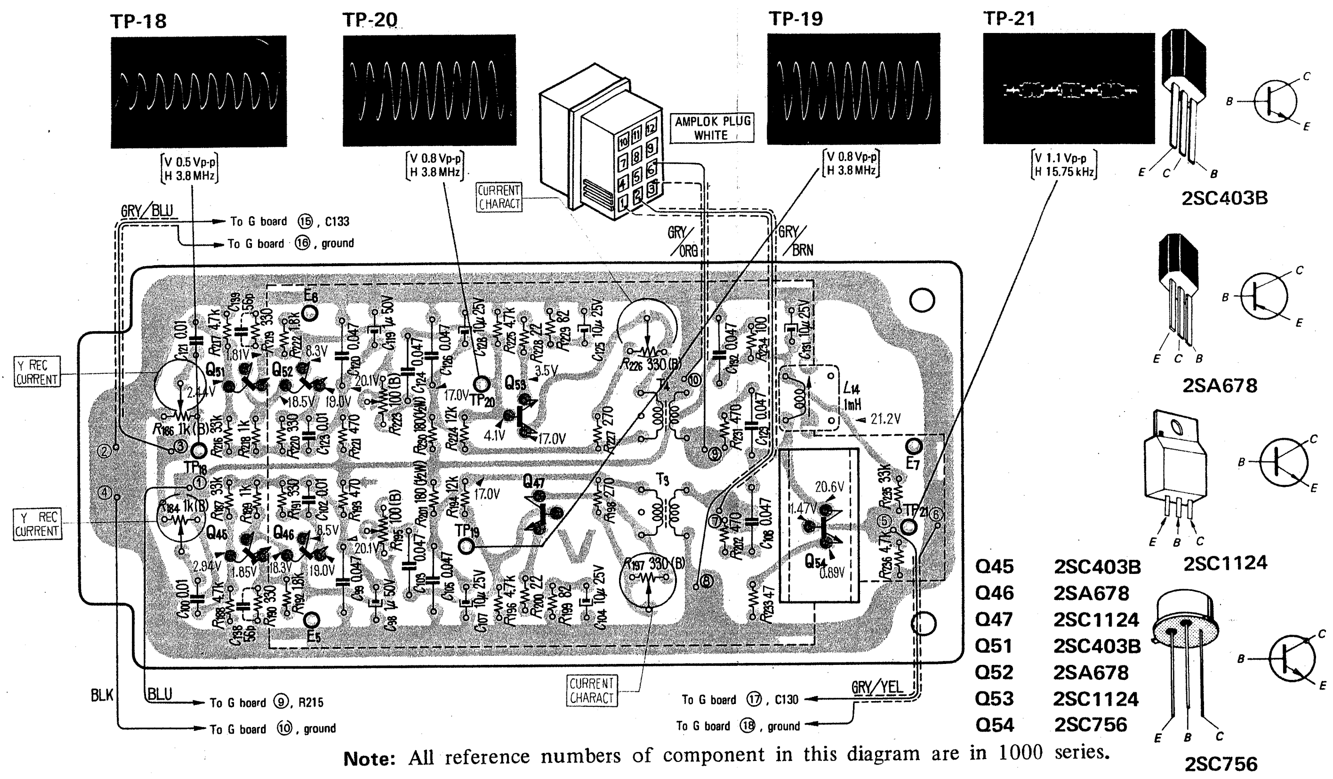

E
To C-R board ②, ③
To C-R board ⑨, ⑩
To H board ⑳, ㉑ Rec amp (R-CH)
To H board ⑭, ⑮ Rec amp (L-CH)
To R board, S6017 (24V)
To B-R (SERVO) board ㉚
To C-R board ⑳, ground
EH AUDIO
EH VIDEO
L6003
S6020
GRY
GRY/BLU
RECORD/ DUBBING SW
L402 22mH
L401 22mH
C408 330p
C407 330p
Q401 2SD291
Q402 2SC634A
TP402
TP401
TP403
C406 30p~200p
C405 30p~200p
T401
C404 0.0039
C403 0.1
R401 470 (B)
BIAS OSC LEVEL ADJ
R406 10 (½W)
R404 10k
R402 15k
R403 10k
R407 10 (½W)
R405 390
C402 0.022
C401 47μ 25V
C410 10μ 25V
20V
0.5V
0.4V
0V (REC Mode)
E401
※C409

Note:

1. All reference numbers of component in this diagram are in 2000 series.
2. All voltages are dc measured with a VOM (20 kΩ/V) and should hold within ±10%.
3. All resistance values are in ohms. K = 1,000, M = 1,000 k
4. All capacitance values are in μF except as indicated with p, which means μμF.

11-26. MOUNTING DIAGRAM — V Board and T Board —

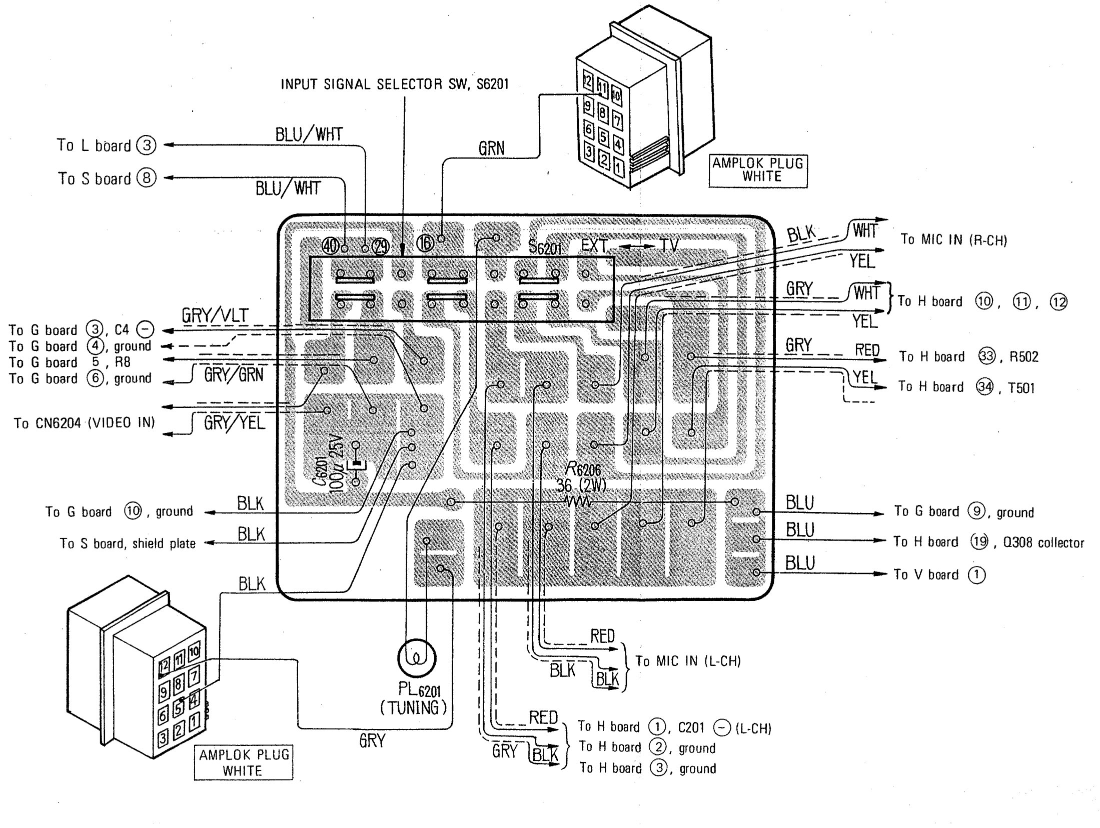
— V Board —


TP-18
TP-20
TP-19
TP-21
V 0.5Vp-p H 3.8MHz
V 0.8Vp-p H 3.8MHz
V 0.8Vp-p H 3.8MHz
V 1.1Vp-p H 15.75kHz
AMPLOK PLUG WHITE
CURRENT CHARACT
GRY/BLU
To G board ⑮, C133
To G board ⑯, ground
Y REC CURRENT
BLK
BLU
To G board ⑨, R215
To G board ⑩, ground
To G board ⑰, C130
To G board ⑱, ground
GRY/YEL
GRY/ORG
GRY/BRN
21.2V
2SC403B
2SA678
2SC1124
2SC756
E C B
Q45 2SC403B
Q46 2SA678
Q47 2SC1124
Q51 2SC403B
Q52 2SA678
Q53 2SC1124
Q54 2SC756

Note: All reference numbers of component in this diagram are in 1000 series.

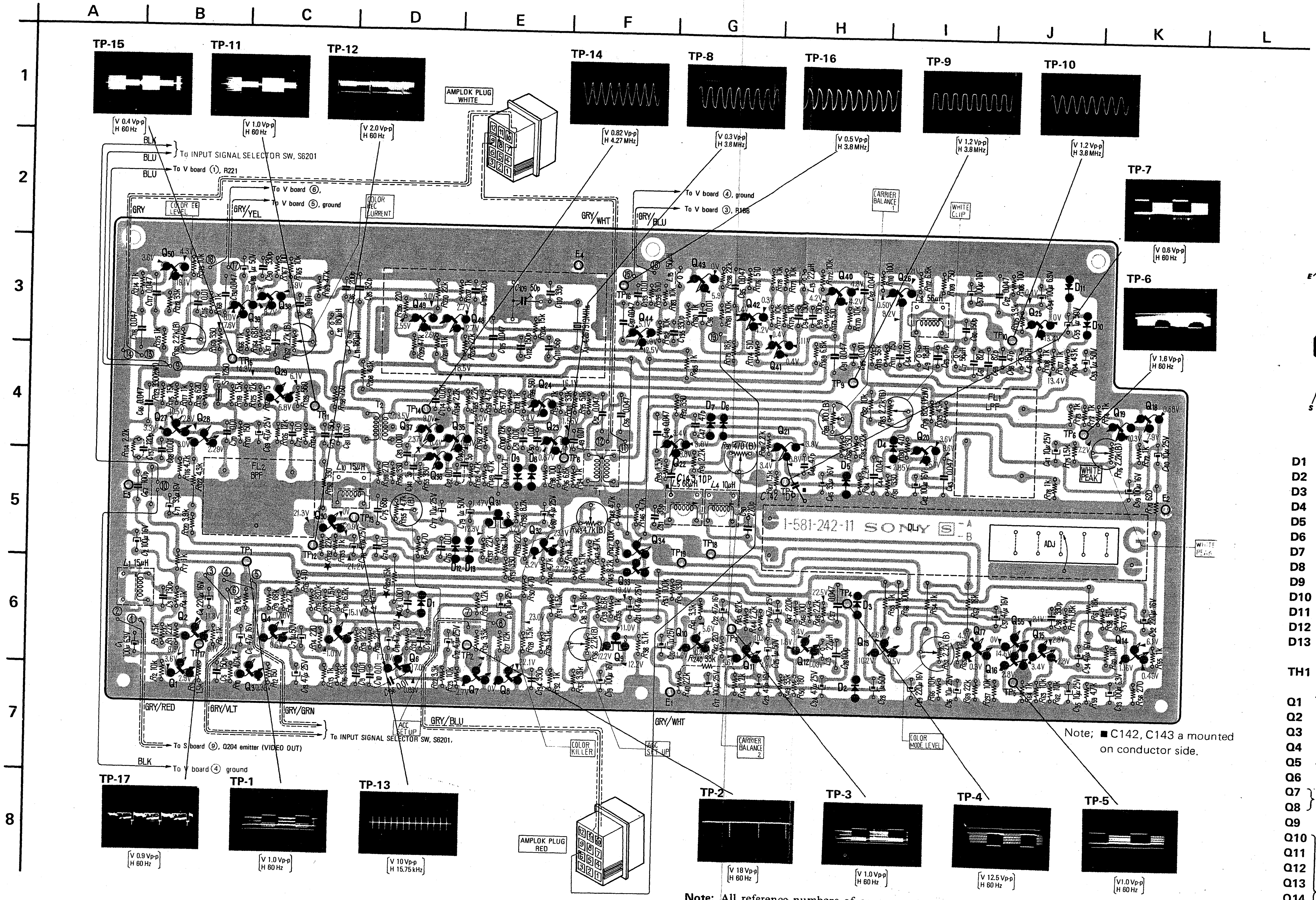
— T Board —

Note: See supplement 1 for WIRING modification.

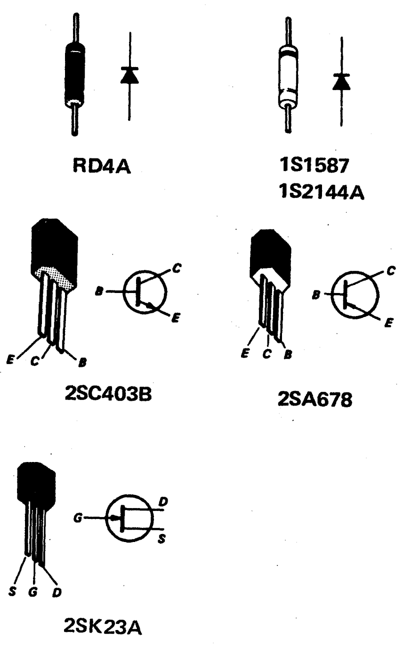

INPUT SIGNAL SELECTOR SW, S6201
AMPLOK PLUG WHITE
To L board ③
To S board ⑧
BLU/WHT
GRN
S6201 EXT ←→ TV
BLK
WHT
YEL
GRY
RED
To MIC IN (R-CH)
To H board ⑩, ⑪, ⑫
To H board ㉝, R502
To H board ㉞, T501
To G board ③, C4 ⊖
To G board ④, ground
To G board 5, R8
To G board ⑥, ground
GRY/VLT
GRY/GRN
To CN6204 (VIDEO IN)
GRY/YEL
To G board ⑩, ground
To S board, shield plate
C6201 100μ 25V
R6206 36 (2W)
BLU
To G board ⑨, ground
To H board ⑲, Q308 collector
To V board ①
To MIC IN (L-CH)
PL6201 (TUNING)
To H board ①, C201 ⊖ (L-CH)
To H board ②, ground
To H board ③, ground
AMPLOK PLUG WHITE

11-27. MOUNTING DIAGRAM

— G Board —


A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
7
8
TP-15
V 0.4 Vp-p
H 60 Hz
TP-11
V 1.0 Vp-p
H 60 Hz
TP-12
V 2.0 Vp-p
H 60 Hz
AMPLOK PLUG WHITE
TP-14
V 0.82 Vp-p
H 4.27 MHz
TP-8
V 0.3 Vp-p
H 3.8 MHz
TP-16
V 0.5 Vp-p
H 3.8 MHz
TP-9
V 1.2 Vp-p
H 3.8 MHz
TP-10
V 1.2 Vp-p
H 3.8 MHz
TP-7
V 0.6 Vp-p
H 60 Hz
TP-6
V 1.8 Vp-p
H 60 Hz
BLK
BLU
To INPUT SIGNAL SELECTOR SW, S6201
BLU
To V board ①, R221
To V board ⑥,
To V board ⑤, ground
GRY
COLOR LEVEL
GRY/YEL
COLOR REC CURRENT
GRY/WHT
GRY/BLU
To V board ④, ground
To V board ③, R166
CARRIER BALANCE 1
WHITE CLIP
FL2 BPF
FL1 LPF
WHITE PEAK
1-581-242-11 SONY
ADJ
GRY/RED
GRY/VLT
GRY/GRN
GRY/BLU
To S board ⑧, Q204 emitter (VIDEO OUT)
To INPUT SIGNAL SELECTOR SW, S6201
BLK
To V board ④ ground
ACC SET UP
COLOR KILLER
AGC SET UP
GRY/WHT
CARRIER BALANCE 2
COLOR MODE LEVEL
TP-17
V 0.9 Vp-p
H 60 Hz
TP-1
V 1.0 Vp-p
H 60 Hz
TP-13
V 10 Vp-p
H 15.75 kHz
AMPLOK PLUG RED
TP-2
V 18 Vp-p
H 60 Hz
TP-3
V 1.0 Vp-p
H 60 Hz
TP-4
V 12.5 Vp-p
H 60 Hz
TP-5
V 1.0 Vp-p
H 60 Hz

Note; ■ C142, C143 a mounted on conductor side.


RD4A
1S1587
1S2144A
2SC403B
2SA678
2SK23A
E C B
G
D
S

D1 D2 D3 D4	1S2144A
D5	RD4A
D6 D7 D8 D9	1S1587
D10 D11 D12 D13	1S2144A
TH1	S1250
Q1 Q2 Q3 Q4 Q5	2SC403B
Q6	2SA678
Q7 Q8	2SC403B
Q9	2SK23A
Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19	2SC403B
Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29	2SC403B
Q30	2SA678
Q31	2SK23A
Q32	2SC403B
Q33 Q34	2SA678
Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44	2SC403B
Q48 Q49 Q50	2SC403B
Q55	2SC403B

Note: All reference numbers of component or test points in this diagram are in 1000 series.

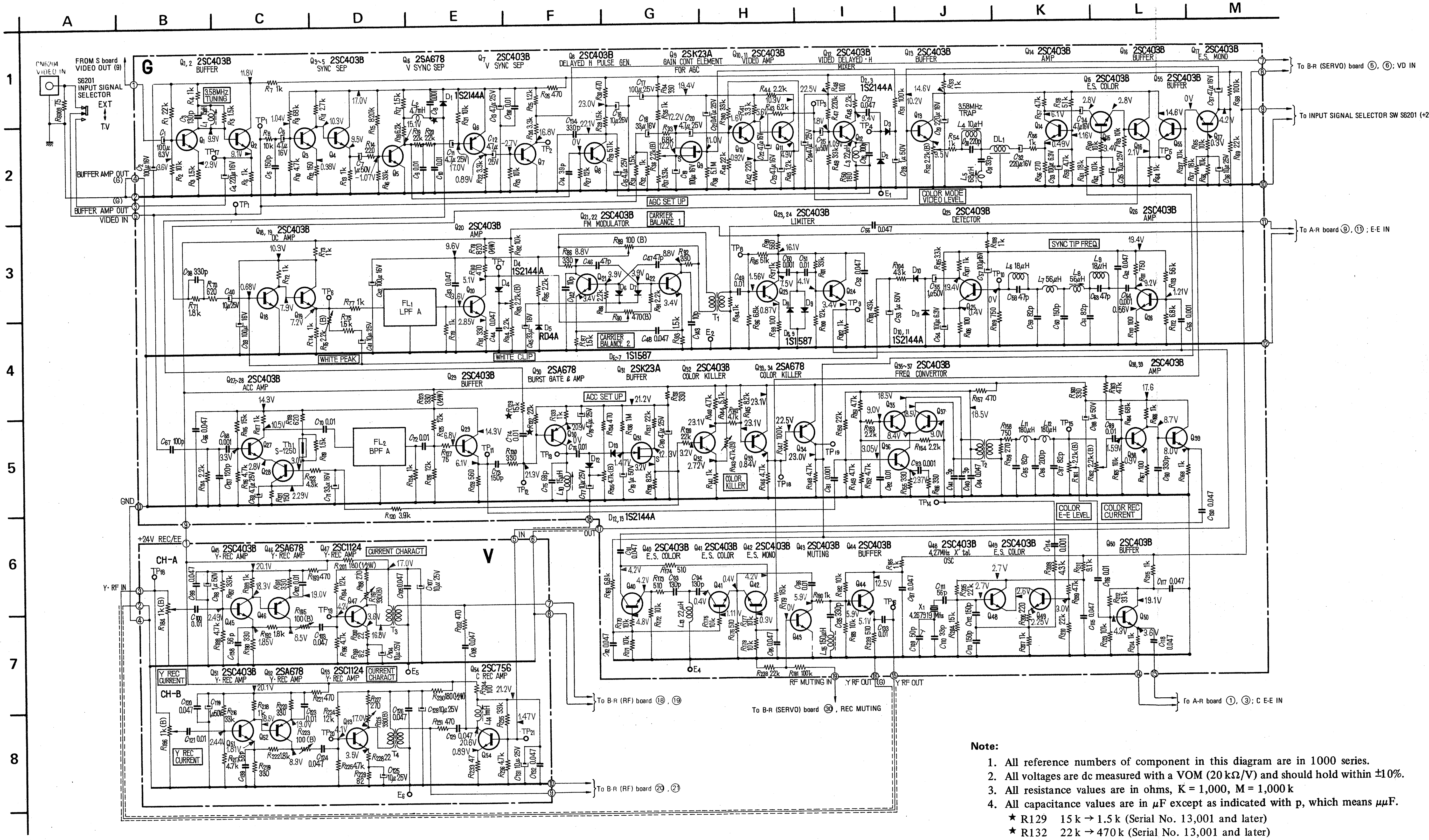
★R129 15 k → 1.5 k (Serial No. 13,001 and later)

★R132 22 k → 470 k (Serial No. 13,001 and later)

★C8 0.001 → 0.0018 (Serial No. 11,851 and later)

11-28. SCHEMATIC DIAGRAM

– G Board and V Board –


A
B
C
D
E
F
G
H
I
J
K
L
M
1
2
3
4
5
6
7
8
G
V
CN6204 VIDEO IN
FROM S board VIDEO OUT (9)
S6201 INPUT SIGNAL SELECTOR
EXT
TV
BUFFER AMP OUT (6)
BUFFER AMP OUT
VIDEO IN
Q1, 2 2SC403B BUFFER
Q3~5 2SC403B SYNC SEP
Q6 2SA678 V SYNC SEP
Q7 2SC403B V SYNC SEP
Q8 2SC403B DELAYED H PULSE GEN.
Q9 2SK23A GAIN CONT ELEMENT FOR AGC
Q10, 11 2SC403B VIDEO AMP
Q12 2SC403B VIDEO DELAYED · H MIXER
Q13 2SC403B BUFFER
Q14 2SC403B AMP
Q15 2SC403B E.S. COLOR
Q16 2SC403B BUFFER
Q17 2SC403B E.S. MONO
Q55 2SC403B BUFFER
3.58MHz TUNING
3.58MHz TRAP
COLOR MODE VIDEO LEVEL
AGC SET UP
CARRIER BALANCE 1
CARRIER BALANCE 2
Q18, 19 2SC403B DC AMP
Q20 2SC403B AMP
Q21, 22 2SC403B FM MODULATOR
Q23, 24 2SC403B LIMITER
Q25 2SC403B DETECTOR
Q26 2SC403B AMP
FL1 LPF A
SYNC TIP FREQ
WHITE PEAK
WHITE CLIP
Q27, 28 2SC403B ACC AMP
Q29 2SC403B BUFFER
Q30 2SA678 BURST GATE & AMP
Q31 2SK23A BUFFER
Q32 2SC403B COLOR KILLER
Q33, 34 2SA678 COLOR KILLER
Q35~37 2SC403B FREQ CONVERTOR
Q38, 39 2SC403B AMP
FL2 BPF A
ACC SET UP
COLOR KILLER
COLOR E-E LEVEL
COLOR REC CURRENT
GND
+24V REC/EE
CH-A
CH-B
Y-RF IN
Q45 2SC403B Y-REC AMP
Q46 2SA678 Y-REC AMP
Q47 2SC1124 Y-REC AMP
CURRENT CHARACT
Y REC CURRENT
Q51 2SC403B Y-REC AMP
Q52 2SA678 Y-REC AMP
Q53 2SC1124 Y-REC AMP
Q54 2SC756 C REC AMP
Q40 2SC403B E.S. COLOR
Q41 2SC403B E.S. COLOR
Q42 2SC403B E.S. MONO
Q43 2SC403B MUTING
Q44 2SC403B BUFFER
Q48 2SC403B 4.27MHz X'tal OSC
Q49 2SC403B E.S. COLOR
Q50 2SC403B BUFFER
RF MUTING IN
Y RF OUT (G)
Y RF OUT
To B-R (SERVO) board ⑤, ⑥; VD IN
To INPUT SIGNAL SELECTOR SW S6201 (+24V)
To A-R board ⑨, ⑪ ; E-E IN
To B-R (RF) board ⑱, ⑲
To B-R (RF) board ⑳, ㉑
To B-R (SERVO) board ㉚, REC MUTING
To A-R board ①, ③; C E-E IN

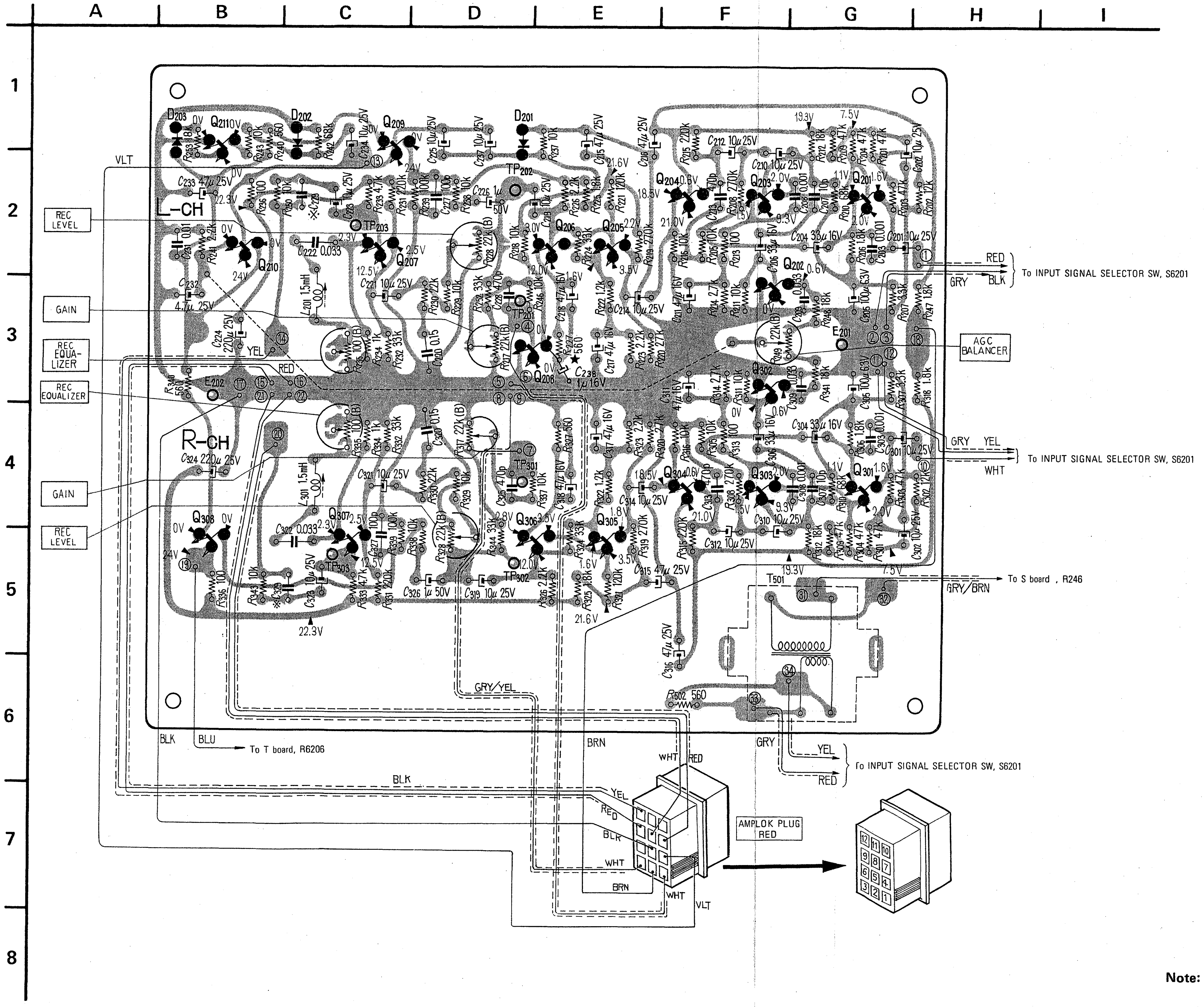
Note:

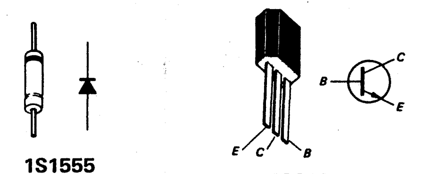
1. All reference numbers of component in this diagram are in 1000 series.
2. All voltages are dc measured with a VOM (20 kΩ/V) and should hold within ±10%.
3. All resistance values are in ohms, K = 1,000, M = 1,000 k
4. All capacitance values are in μF except as indicated with p, which means $\mu\mu$F.

★ R129 15 k → 1.5 k (Serial No. 13,001 and later)
★ R132 22 k → 470 k (Serial No. 13,001 and later)
★ C8 0.001 → 0.0018 (Serial No. 11,851 and later)

11-29. MOUNTING DIAGRAM

– H Board –


A
B
C
D
E
F
G
H
I
1
2
3
4
5
6
7
8
VLT
REC LEVEL
GAIN
REC EQUA-LIZER
REC EQUALIZER
GAIN
REC LEVEL
L-CH
R-CH
AGC BALANCER
RED
GRY
BLK
To INPUT SIGNAL SELECTOR SW, S6201
GRY YEL
WHT
To INPUT SIGNAL SELECTOR SW, S6201
GRY/BRN
To S board , R246
T501
GRY/YEL
BLK
BLU
To T board, R6206
BRN
GRY
YEL
RED
To INPUT SIGNAL SELECTOR SW, S6201
WHT
RED
YEL
RED
BLK
WHT
BRN
WHT
VLT
AMPLOK PLUG RED



1S1555

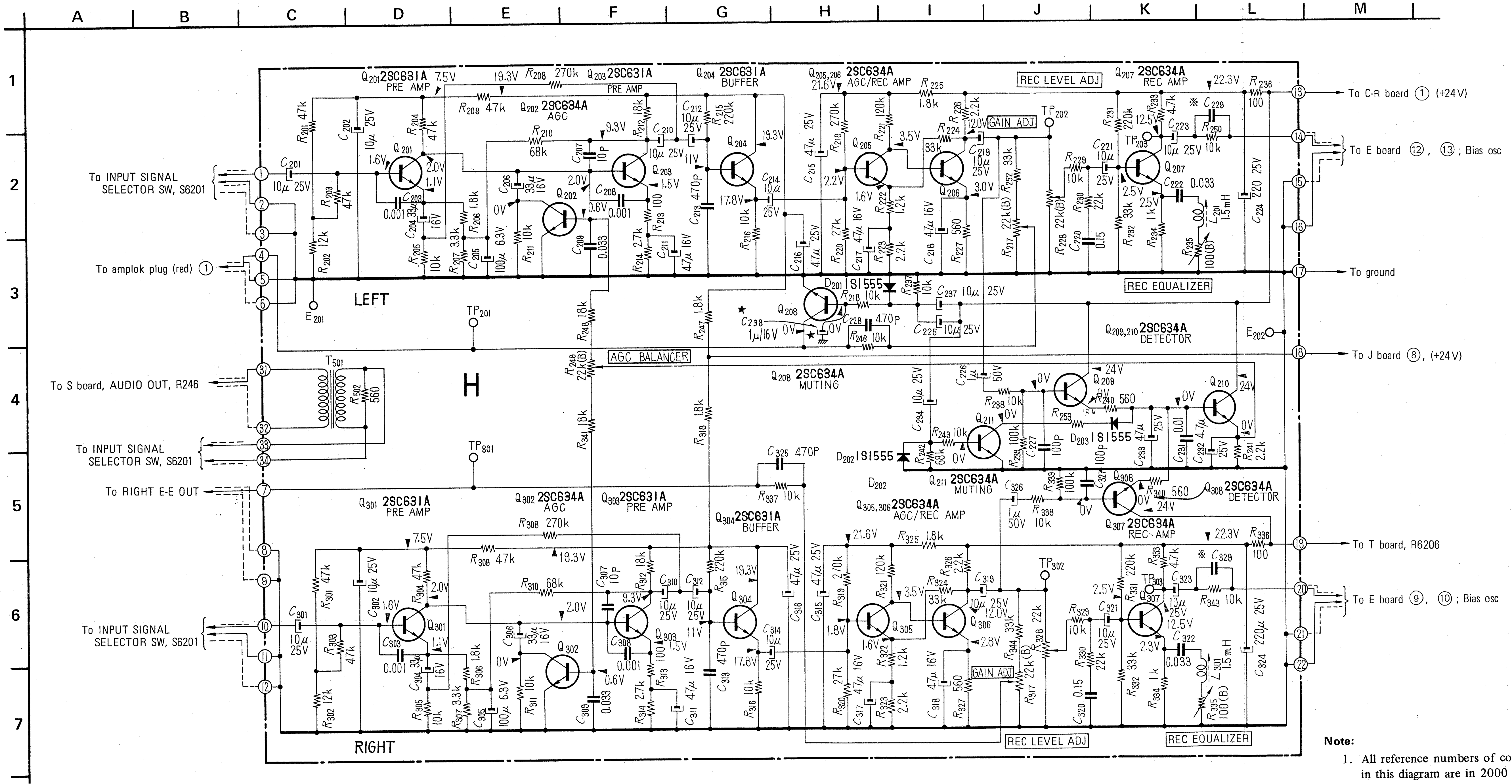
2SC631A
2SC634A

D201 D202 D203	1S1555
Q201 (Q301) Q202 (Q302) Q203 (Q303) Q204 (Q304)	2SC631A
Q205 (Q305) Q206 (Q306) Q207 (Q307) Q208 (Q308) Q209 Q210 Q211	2SC634A

Note: All reference numbers of component or test points in this diagram are in 2000 series.
※ should be selected.
★ C238 is mounted for the set Serial No. 13,401 and later.

11-30. SCHEMATIC DIAGRAM

– H Board –


A B C D E F G H I J K L M
1 2 3 4 5 6 7
Q201 2SC631A PRE AMP
Q202 2SC634A AGC
Q203 2SC631A PRE AMP
Q204 2SC631A BUFFER
Q205,206 2SC634A AGC/REC AMP
Q207 2SC634A REC AMP
Q208 2SC634A MUTING
Q209,210 2SC634A DETECTOR
Q211 2SC634A MUTING
D201 1S1555
D202 1S1555
D203 1S1555
Q301 2SC631A PRE AMP
Q302 2SC634A AGC
Q303 2SC631A PRE AMP
Q304 2SC631A BUFFER
Q305,306 2SC634A AGC/REC AMP
Q307 2SC634A REC AMP
Q308 2SC634A DETECTOR
REC LEVEL ADJ
GAIN ADJ
REC EQUALIZER
AGC BALANCER
LEFT
RIGHT
H
TP201
TP202
TP301
TP302
E201
E202
T501
To INPUT SIGNAL SELECTOR SW, S6201
To amplok plug (red) ①
To S board, AUDIO OUT, R246
To RIGHT E-E OUT
To C-R board ① (+24V)
To E board ⑫, ⑬ ; Bias osc
To ground
To J board ⑧, (+24V)
To T board, R6206
To E board ⑨, ⑩ ; Bias osc
C238 1μ/16V
★

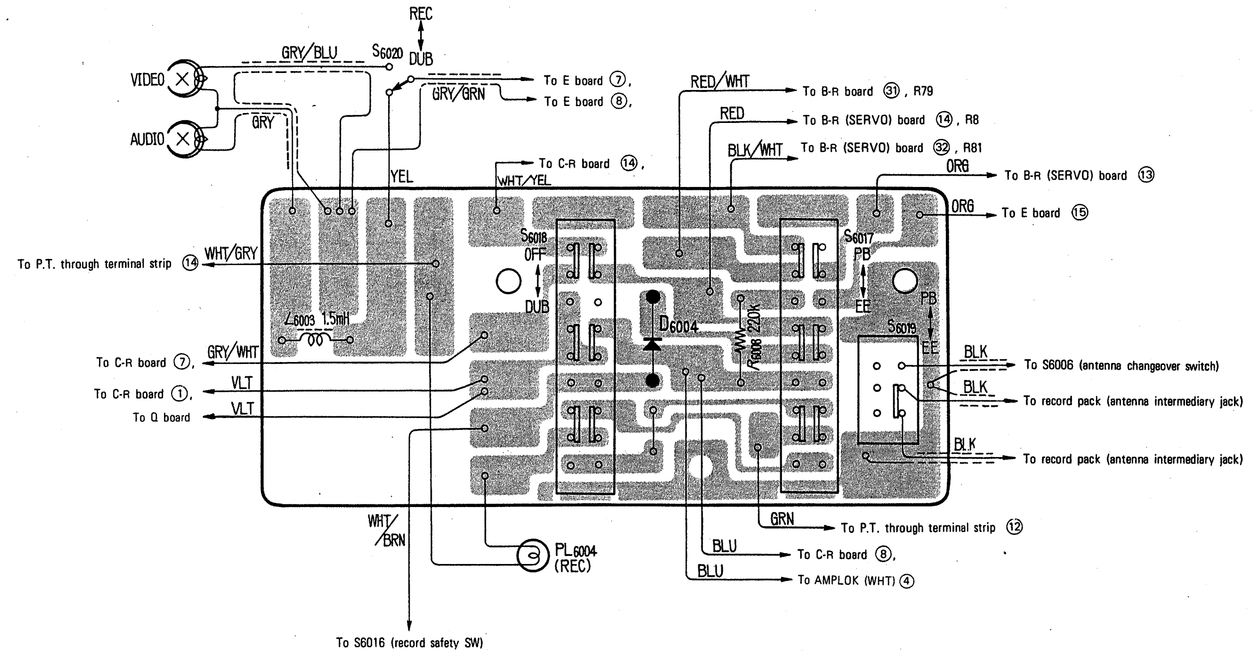
Note:

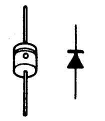
1. All reference numbers of component in this diagram are in 2000 series.
2. All voltages are dc measured with a VOM (20kΩ/V) and should hold within ±10%.
3. All resistance values are in ohms. K = 1,000, M = 1,000k
4. All capacitance values are in μF except as indicated with p, which means μμF.

★ C238 is mounted for the set Serial No. 13,401 and later.

11-31. MOUNTING DIAGRAM

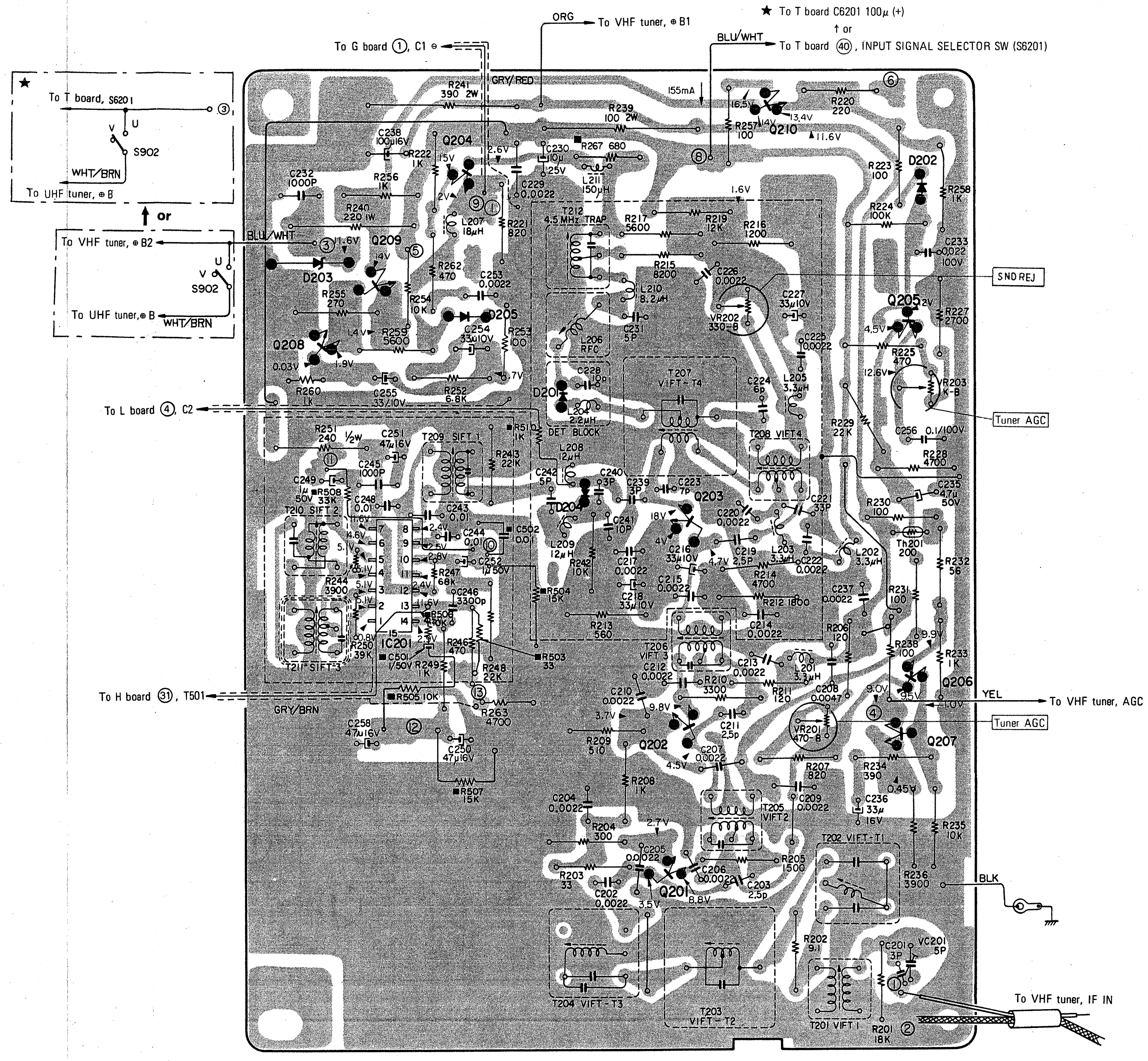
– R Board –


REC
DUB
S6020
GRY/BLU
GRY/GRN
VIDEO
AUDIO
GRY
YEL
To E board ⑦.
To E board ⑧.
RED/WHT
To B-R board ㉛, R79
RED
To B-R (SERVO) board ⑭, R8
BLK/WHT
To B-R (SERVO) board ㉜, R81
To C-R board ⑭.
WHT/YEL
ORG
To B-R (SERVO) board ⑬
To E board ⑮
To P.T. through terminal strip ⑭
WHT/GRY
S6018
OFF
DUB
S6017
PB
EE
S6019
D6004
L6003 1.5mH
GRY/WHT
To C-R board ⑦.
VLT
To C-R board ①.
To Q board
BLK
To S6006 (antenna changeover switch)
To record pack (antenna intermediary jack)
To record pack (antenna intermediary jack)
GRN
To P.T. through terminal strip ⑫
BLU
To C-R board ⑧.
To AMPLOK (WHT) ④
WHT/BRN
PL6004 (REC)
To S6016 (record safety SW)



D6004 10D-2

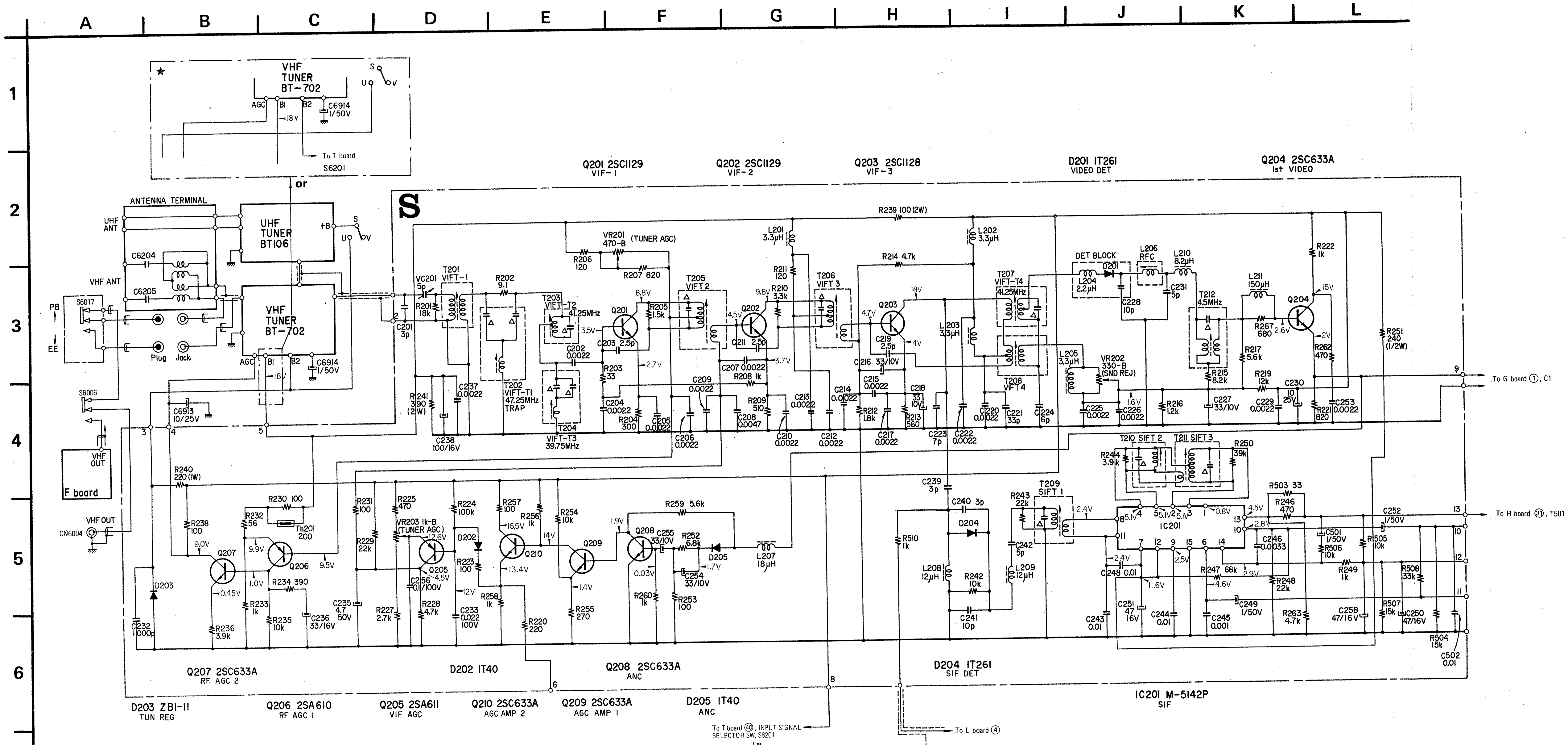
11-32. MOUNTING DIAGRAM – S Board –


★ To T board C6201 100μ (+)
↑ or
BLU/WHT
To T board ㊵, INPUT SIGNAL SELECTOR SW (S6201)
ORG
To VHF tuner, ⊕B1
To G board ①, C1 ⊕
★
To T board, S6201
U
V
S902
WHT/BRN
To UHF tuner, ⊕B
↑ or
To VHF tuner, ⊕B2
To UHF tuner,⊕B
To L board ④, C2
To H board ㉛, T501
GRY/RED
GRY/BRN
SND REJ
Tuner AGC
YEL
To VHF tuner, AGC
Tuner AGC
BLK
To VHF tuner, IF IN
IC201
Q201
Q202
Q203
Q204
Q205
Q206
Q207
Q208
Q209
Q210
D201
D202
D203
D204
D205
T201 VIFT 1
T202 VIFT-T1
T203 VIFT-T2
T204 VIFT-T3
T205 VIFT2
T206 VIFT 3
T207 VIFT-T4
T208 VIFT4
T209 SIFT 1
T210 SIFT 2
T211 SIFT 3
T212 4.5MHz TRAP
VR201 470-B
VR202 330-B
DET BLOCK
155mA

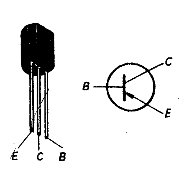
Note: All reference numbers of component or test points in this diagram are in 8000 series.
★ Due to T board wiring change. See Supplement 1, page 10.

D201	**1T261**	**Q201**	**2SC1129**	**Q207**	**2SC633A**	**IC201**	**M-5142P**
D202	**1T40**	**Q202**		**Q208**			
D203	**ZB1-11**	**Q203**	**2SC1128**	**Q209**			
D204	**1T261**	**Q204**	**2SC633A**	**Q210**			
D205	**1T40**	**Q205**	**2SA611 or 2SA564A**				
		Q206	**2SA610 or 2SA564A**				

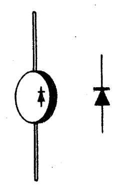
11-33. SCHEMATIC DIAGRAM – S Board –


A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
7
VHF TUNER BT-702
To T board S6201
or
ANTENNA TERMINAL
UHF ANT
VHF ANT
UHF TUNER BT106
VHF TUNER BT-702
F board
VHF OUT
CN6004
S
Q201 2SC1129 VIF-1
Q202 2SC1129 VIF-2
Q203 2SC1128 VIF-3
D201 1T261 VIDEO DET
Q204 2SC633A 1st VIDEO
R239 100 (2W)
VR201 470-B (TUNER AGC)
DET BLOCK
To G board ①, C1
To H board ㉛, T501
IC201
Q207 2SC633A RF AGC 2
D202 1T40
Q208 2SC633A ANC
D204 1T261 SIF DET
D203 ZB1-11 TUN REG
Q206 2SA610 RF AGC 1
Q205 2SA611 VIF AGC
Q210 2SC633A AGC AMP 2
Q209 2SC633A AGC AMP 1
D205 1T40 ANC
IC201 M-5142P SIF
To T board ㊵, INPUT SIGNAL SELECTOR SW, S6201
To L board ④
★ To T board, C6201 100μ (+)

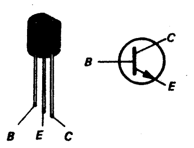
Note: Due to T board wiring change.
★ See **SUPPLEMENT** 1 page 10.



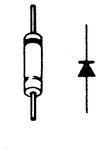
2SA564A



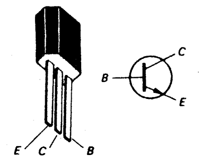
ZB1-11



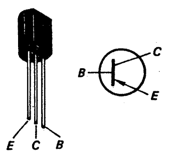
2SC1129
2SC1128



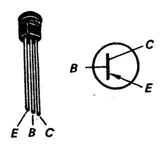
1T40
1T261



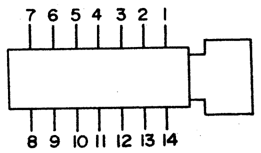
2SC633A



2SA611



2SA610

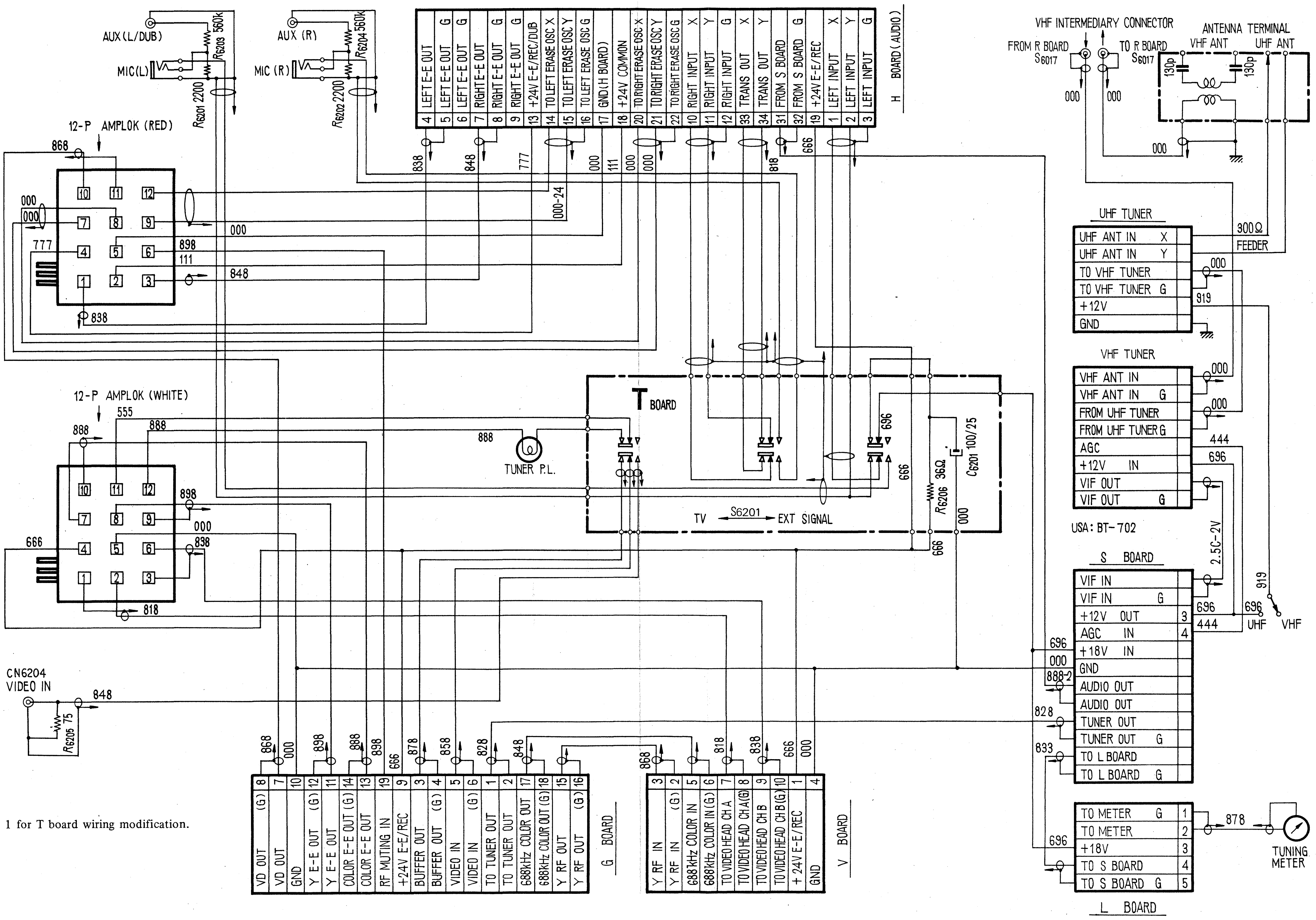

7 6 5 4 3 2 1
8 9 10 11 12 13 14

M-5142P

Note:

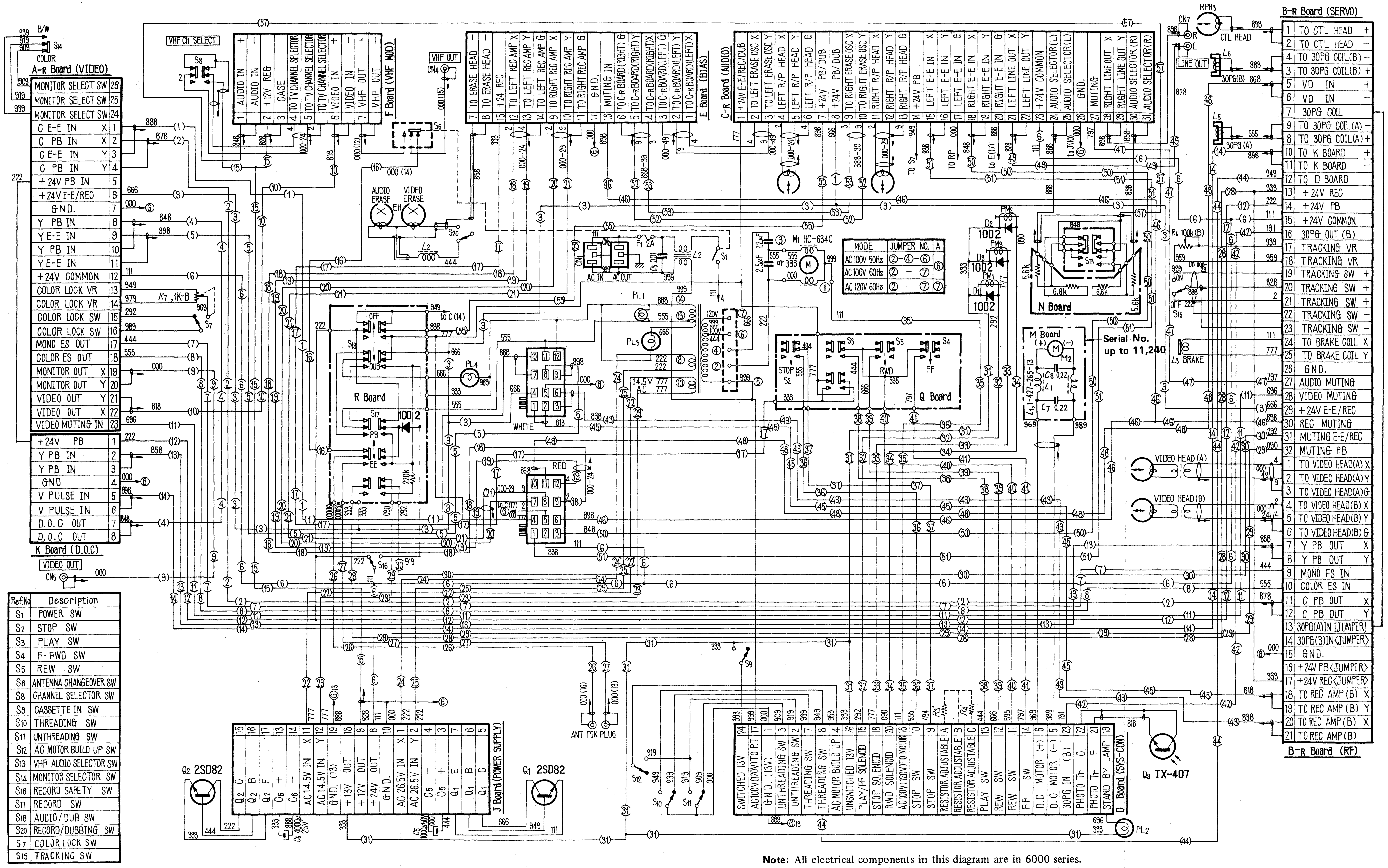
1. All reference numbers of component in this diagram are in 8000 series.
2. All voltages are dc measured with a VOM (20 kΩ/V) and should hold within ±10%.
3. All resistance values are in ohms. K = 1,000, M = 1,000 k
4. All capacitance values are in μF except as indicated with p, which means μμF.

11-34. FRAME WIRING DIAGRAM (1) – Record Pack Section –


AUX (L/DUB)
MIC (L)
R6203 560k
R6201 2200
AUX (R)
MIC (R)
R6204 560k
R6202 2200
12-P AMPLOK (RED)
868
000
777
898
111
848
838
4 LEFT E-E OUT
5 LEFT E-E OUT G
6 LEFT E-E OUT G
7 RIGHT E-E OUT
8 RIGHT E-E OUT G
9 RIGHT E-E OUT G
13 +24V E-E/REC/DUB
14 TO LEFT ERASE OSC X
15 TO LEFT ERASE OSC Y
16 TO LEFT ERASE OSC G
17 GND (H BOARD)
18 +24V COMMON
20 TO RIGHT ERASE OSC X
21 TO RIGHT ERASE OSC Y
22 TO RIGHT ERASE OSC G
10 RIGHT INPUT X
11 RIGHT INPUT Y
12 RIGHT INPUT G
33 TRANS OUT X
34 TRANS OUT Y
31 FROM S BOARD
32 FROM S BOARD G
19 +24V E-E/REC
1 LEFT INPUT X
2 LEFT INPUT Y
3 LEFT INPUT G
H BOARD (AUDIO)
000-24
818
666
12-P AMPLOK (WHITE)
555
888
TUNER P.L.
T BOARD
696
999
R6206 36Ω
C6201 100/25
TV ← S6201 → EXT SIGNAL
CN6204 VIDEO IN
R6205 75
8 VD OUT (G)
7 VD OUT
10 GND
12 Y E-E OUT (G)
11 Y E-E OUT
14 COLOR E-E OUT (G)
13 COLOR E-E OUT
19 RF MUTING IN
9 +24V E-E/REC
3 BUFFER OUT
4 BUFFER OUT (G)
5 VIDEO IN
6 VIDEO IN (G)
1 TO TUNER OUT
2 TO TUNER OUT
17 688kHz COLOR OUT
18 688kHz COLOR OUT (G)
15 Y RF OUT
16 Y RF OUT (G)
G BOARD
878
858
828
3 Y RF IN
2 Y RF IN (G)
5 688kHz COLOR IN
6 688kHz COLOR IN (G)
7 TO VIDEO HEAD CH A
8 TO VIDEO HEAD CH A (G)
9 TO VIDEO HEAD CH B
10 TO VIDEO HEAD CH B (G)
1 + 24V E-E/REC
4 GND
V BOARD
VHF INTERMEDIARY CONNECTOR
FROM R BOARD S6017
TO R BOARD S6017
ANTENNA TERMINAL
VHF ANT
UHF ANT
130p
130p
UHF TUNER
UHF ANT IN X
UHF ANT IN Y
TO VHF TUNER
TO VHF TUNER G
+12V
GND
300Ω FEEDER
919
VHF TUNER
VHF ANT IN
VHF ANT IN G
FROM UHF TUNER
FROM UHF TUNER G
AGC
+12V IN
VIF OUT
VIF OUT G
444
USA: BT-702
2.5C-2V
S BOARD
VIF IN
VIF IN G
3 +12V OUT
4 AGC IN
+18V IN
GND
AUDIO OUT
AUDIO OUT
TUNER OUT
TUNER OUT G
TO L BOARD
TO L BOARD G
888-2
833
UHF
VHF
1 TO METER G
2 TO METER
3 +18V
4 TO S BOARD
5 TO S BOARD G
L BOARD
TUNING METER

Note: See supplement 1 for T board wiring modification.

11-35. FRAME WIRING DIAGRAM (2) – Main Chassis Section – (Serial No. up to 11,000)

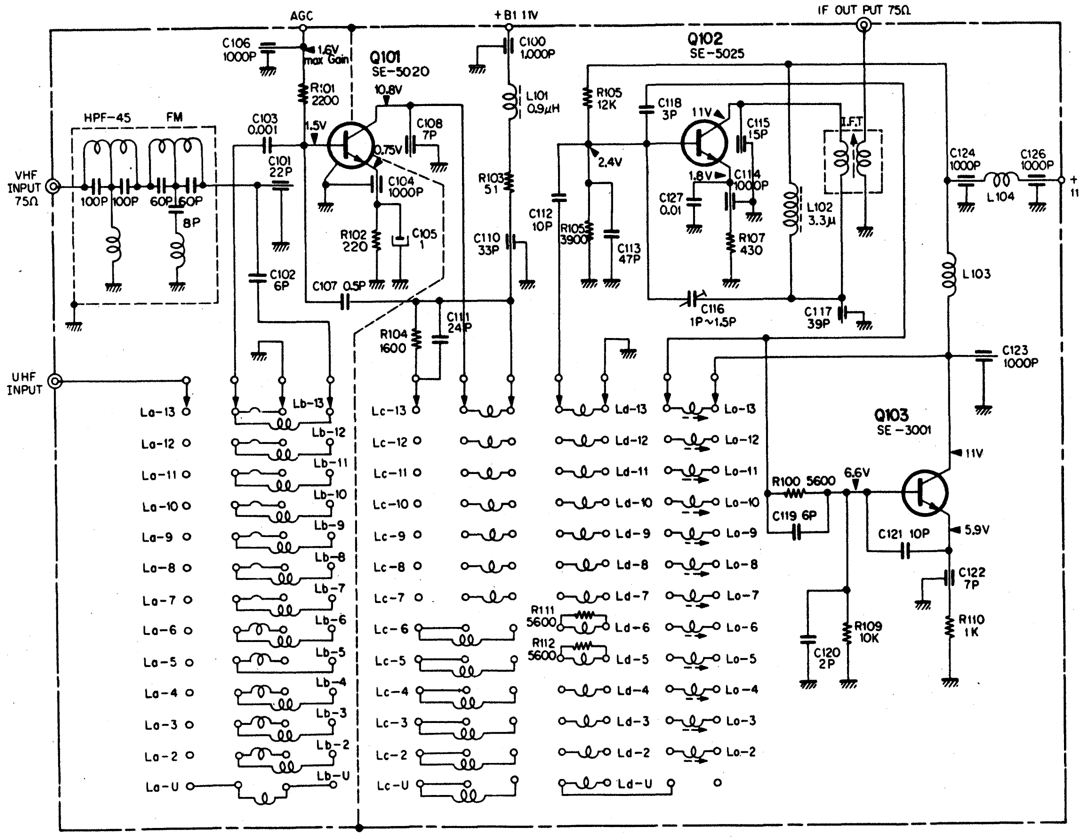

A-R Board (VIDEO)
K Board (D.O.C)
F Board (VHF MOD)
E Board (BIAS)
C-R Board (AUDIO)
B-R Board (SERVO)
B-R Board (RF)
R Board
Q Board
N Board
M Board
J Board (POWER SUPPLY)
D Board (SYS-CON)
VHF CH SELECT
VHF OUT
VIDEO OUT
LINE OUT
AUDIO ERASE
VIDEO ERASE
AC IN
AC OUT
ANT PIN PLUG
CTL HEAD
VIDEO HEAD (A)
VIDEO HEAD (B)
M1 HC-634C
Q2 2SD82
Q1 2SD82
Q3 TX-407
Serial No. up to 11,240
L3 BRAKE
PL1
PL2
PL3
PL4
F1 2A
WHITE
RED

MODE	JUMPER NO.	A
AC 100V 50Hz	②-④-⑥	⑥
AC 100V 60Hz	② - ⑦	
AC 120V 60Hz	② - ⑦	⑦

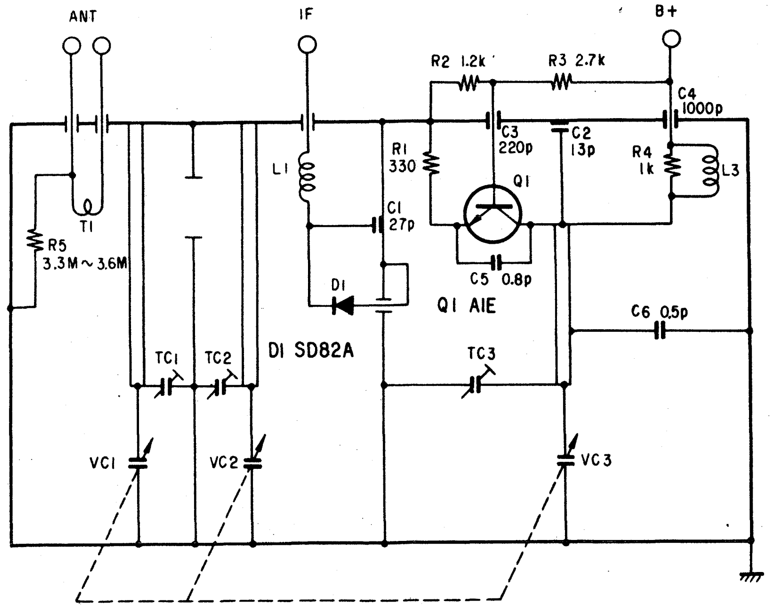
Ref.No	Description
S_1	POWER SW
S_2	STOP SW
S_3	PLAY SW
S_4	F·FWD SW
S_5	REW SW
S_6	ANTENNA CHANGEOVER SW
S_8	CHANNEL SELECTOR SW
S_9	CASSETTE IN SW
S_{10}	THREADING SW
S_{11}	UNTHREADING SW
S_{12}	AC MOTOR BUILD UP SW
S_{13}	VHF AUDIO SELECTOR SW
S_{14}	MONITOR SELECTOR SW
S_{16}	RECORD SAFETY SW
S_{17}	RECORD SW
S_{18}	AUDIO/DUB SW
S_{20}	RECORD/DUBBING SW
S_7	COLOR LOCK SW
S_{15}	TRACKING SW

Note: All electrical components in this diagram are in 6000 series.

11-36. SCHEMATIC DIAGRAM – VHF Tuner and UHF Tuner –


AGC
+B1 11V
IF OUT PUT 75Ω
VHF INPUT 75Ω
UHF INPUT
HPF-45
FM
100P
100P
60P
60P
8P
C106 1000P
1.6V max Gain
R101 2200
Q101 SE-5020
10.8V
1.5V
0.75V
C103 0.001
C101 22P
C102 6P
C104 1000P
C105 1
C107 0.5P
C108 7P
R102 220
R104 1600
C111 24P
C100 1,000P
L101 0.9μH
R103 51
C110 33P
C112 10P
R105 12K
R105 3900
C113 47P
2.4V
Q102 SE-5025
C118 3P
11V
1.8V
C115 15P
C114 1000P
C127 0.01
R107 430
C116 1P~1.5P
L102 3.3μ
I.F.T
C117 39P
C124 1000P
C126 1000P
L104
+B2 11V
L103
C123 1000P
Q103 SE-3001
11V
6.6V
5.9V
R100 5600
C119 6P
C121 10P
C122 7P
R109 10K
R110 1K
C120 2P
R111 5600
R112 5600
La-13
La-12
La-11
La-10
La-9
La-8
La-7
La-6
La-5
La-4
La-3
La-2
La-U
Lb-13
Lb-12
Lb-11
Lb-10
Lb-9
Lb-8
Lb-7
Lb-6
Lb-5
Lb-4
Lb-3
Lb-2
Lb-U
Lc-13
Lc-12
Lc-11
Lc-10
Lc-9
Lc-8
Lc-7
Lc-6
Lc-5
Lc-4
Lc-3
Lc-2
Lc-U
Ld-13
Ld-12
Ld-11
Ld-10
Ld-9
Ld-8
Ld-7
Ld-6
Ld-5
Ld-4
Ld-3
Ld-2
Ld-U
Lo-13
Lo-12
Lo-11
Lo-10
Lo-9
Lo-8
Lo-7
Lo-6
Lo-5
Lo-4
Lo-3
Lo-2

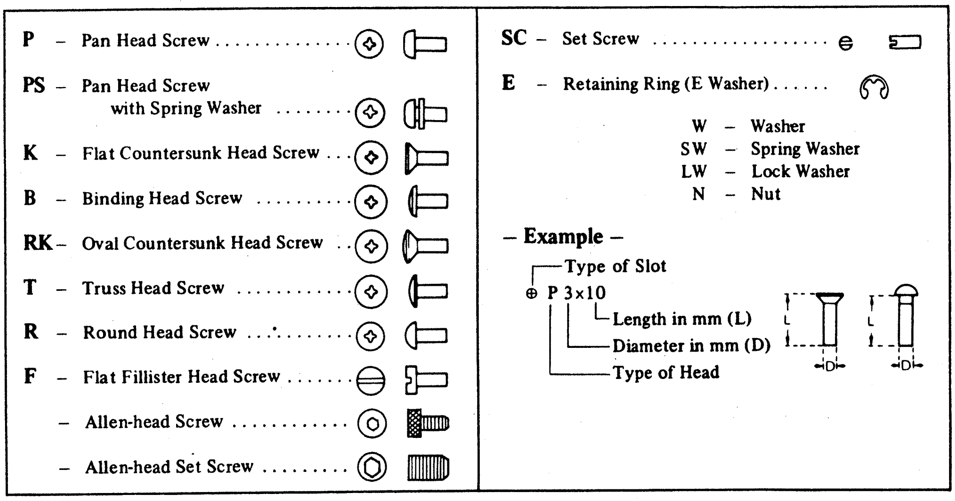
– UHF Tuner –


ANT
IF
B+
T1
R5 3.3M~3.6M
L1
C1 27p
D1
D1 SD82A
R1 330
R2 1.2k
R3 2.7k
C3 220p
C2 13p
Q1
Q1 A1E
C5 0.8p
C4 1000p
R4 1k
L3
C6 0.5p
TC1
TC2
TC3
VC1
VC2
VC3

SECTION 12
EXPLODED VIEWS

12-1. HARDWARE

(1) The following chart will help you to decipher the hardware codes given in the exploded views.



P – Pan Head Screw
PS – Pan Head Screw with Spring Washer
K – Flat Countersunk Head Screw
B – Binding Head Screw
RK – Oval Countersunk Head Screw
T – Truss Head Screw
R – Round Head Screw
F – Flat Fillister Head Screw
– Allen-head Screw
– Allen-head Set Screw

SC – Set Screw
E – Retaining Ring (E Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

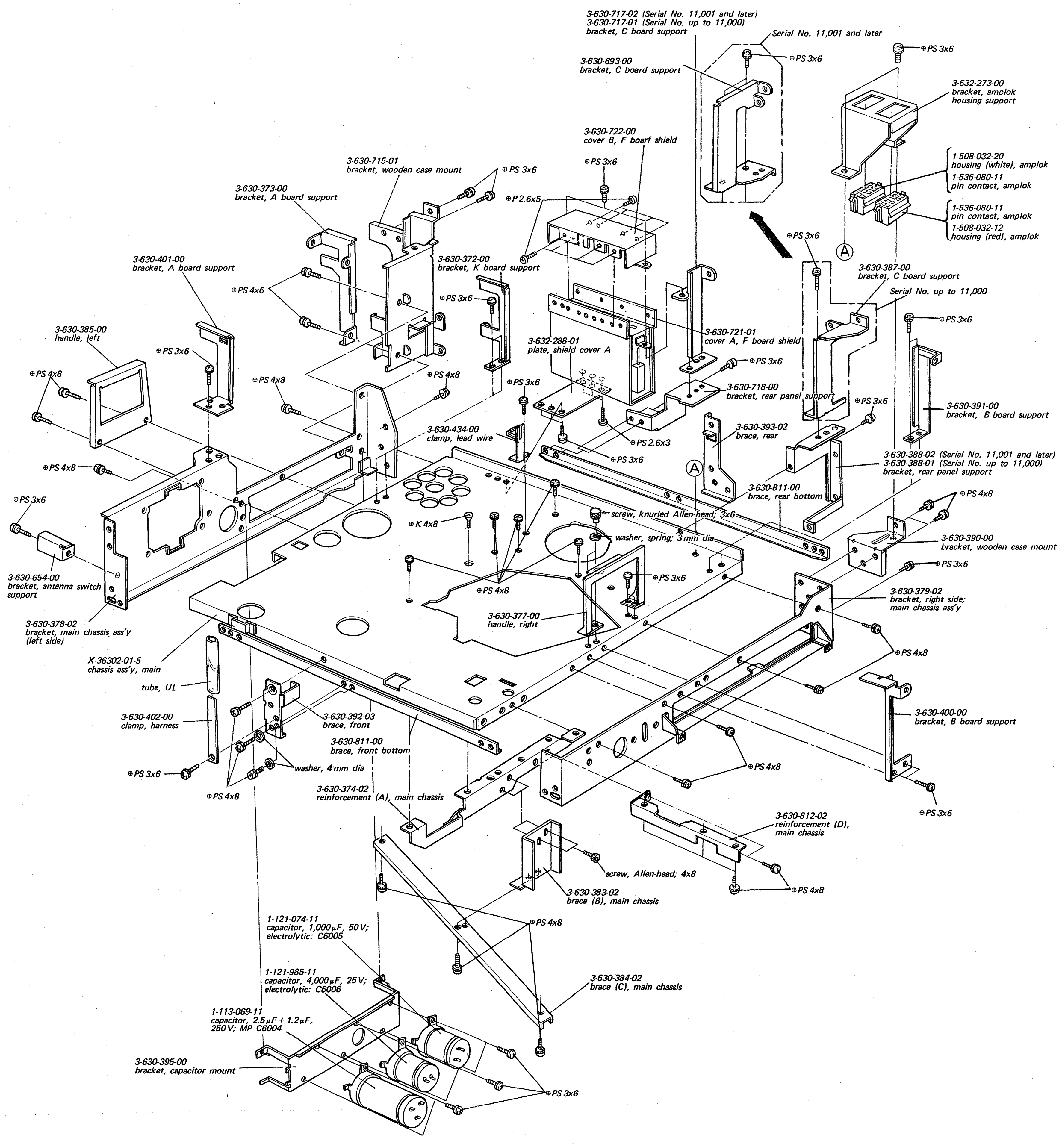
– Example –

⊕ P 3x10
Type of Slot
Length in mm (L)
Diameter in mm (D)
Type of Head

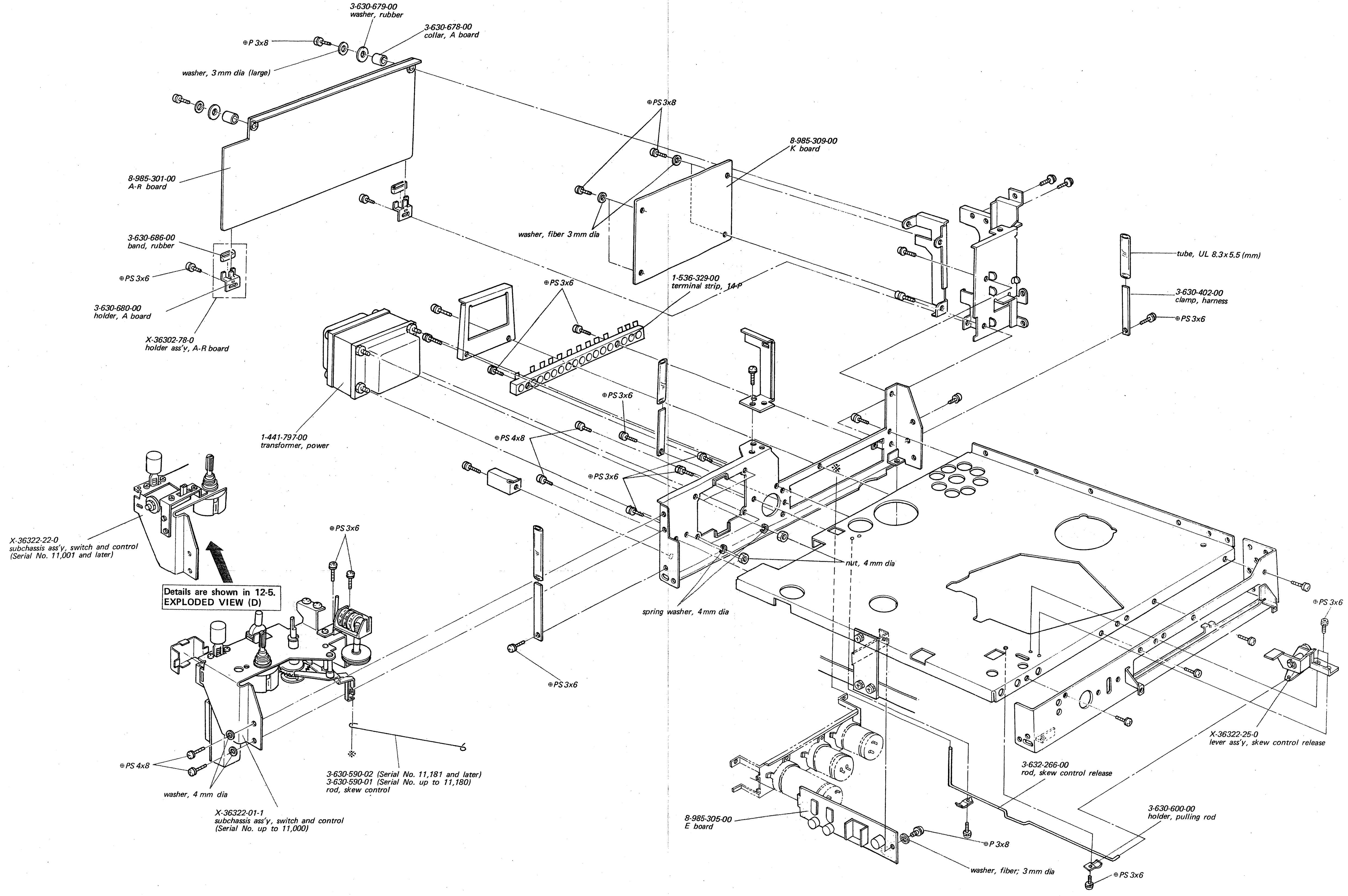
(2) To simply the exploded view, the part numbers of normal screws, nut, washers, and retaining rings are not expressed but summarized in the table below.

Part No.	*Description*
7-621-259-25	screw, ⊕ P 2.6 x 4
7-621-259-35	screw, ⊕ P 2.6 x 5
7-621-259-55	screw, ⊕ P 2.6 x 8
7-621-259-85	screw, ⊕ P 2.6 x 14
7-621-260-05	screw, ⊕ P 2.6 x 16
7-621-559-15	screw, ⊕ K 2.6 x 3
7-621-559-25	screw, ⊕ K 2.6 x 4
7-621-559-35	screw, ⊕ K 2.6 x 5
7-621-559-45	screw, ⊕ K 2.6 x 6
3-701-501-01	set screw, Allen-head 2 x 3
3-701-504-01	set screw, Allen-head 2.6 x 10
7-621-773-65	screw, ⊕ B 2.6 x 4
7-623-107-02	washer, 2.6 mm dia (small)
7-623-107-12	washer, 2.6 mm dia (middle)
7-623-108-02	washer, 3 mm dia (small)
7-623-108-12	washer, 3 mm dia (middle)
7-623-108-20	washer, 3 mm dia (middle)
7-623-108-22	washer, 3 mm dia (large)
7-623-110-02	washer, 4 mm dia (small)
7-623-110-12	washer, 4 mm dia (middle)
7-623-112-12	washer, 5 mm dia (middle)
7-623-207-12	washer, spring 2.6 mm dia
7-623-208-12	washer, spring 3 mm dia
7-623-210-12	washer, spring 4 mm dia
7-623-408-01	lock washer, external tooth; 3 mm dia
7-623-412-01	lock washer, external tooth; 5 mm dia
7-623-508-01	lug, 3 mm dia
7-623-510-01	lug, 4 mm dia
7-623-618-00	eyelet, 2 x 5
7-623-633-00	eyelet, 3 x 5
7-623-639-00	eyelet, 4 x 5
7-623-905-01	washer, fiber 2 mm dia
7-623-908-01	washer, fiber 3 mm dia
7-623-910-21	washer, fiber 4 mm dia (t = 0.25)
7-623-910-31	washer, fiber 4 mm dia (t = 0.5)
7-623-912-21	washer, fiber 5 mm dia (t = 0.25)
7-623-912-31	washer, fiber 5 mm dia (t = 0.5)
7-624-104-01	retaining ring, 2 mm dia
7-624-105-01	retaining ring, 2.3 mm dia
7-624-106-01	retaining ring, 3 mm dia
7-624-108-01	retaining ring, 4 mm dia
7-624-109-01	retaining ring, 5 mm dia
7-624-110-01	retaining ring, 6 mm dia
7-624-112-01	retaining ring, 8 mm dia
7-624-132-01	retaining clip, type "C"; 10 mm dia
7-624-132-11	retaining clip, type "C"; 10 mm dia
7-624-190-31	retaining clip, type "C-STW"; 4 mm dia
7-626-202-31	cotter pin, 1 x 10 mm dia
7-626-204-41	cotter pin, 1.6 x 12 mm dia
7-629-100-19	nail, R 1 x 6
7-681-668-01	screw, ⊖ F 4 x 30
7-682-146-01	screw, ⊕ P 3 x 5
7-682-148-13	screw, ⊕ P 3 x 8
7-682-161-05	screw, ⊕ P 4 x 8
7-682-175-01	screw, ⊕ P 5 x 10
7-682-247-01	screw, ⊕ K 3 x 6
7-682-248-01	screw, ⊕ K 3 x 8
7-682-370-07	screw, ⊕ RK 4 x 40
7-682-545-05	screw, ⊕ B 3 x 4
7-682-547-05	screw, ⊕ B 3 x 6
7-682-553-05	screw, ⊕ B 3 x 20
7-682-645-01	screw, ⊕ PS 3 x 4
7-682-646-01	screw, ⊕ PS 3 x 5
7-682-647-01	screw, ⊕ PS 3 x 6
7-682-647-05	screw, ⊕ PS 3 x 6
7-682-648-01	screw, ⊕ PS 3 x 8
7-682-649-01	screw, ⊕ PS 3 x 10
7-682-650-01	screw, ⊕ PS 3 x 12
7-682-661-01	screw, ⊕ PS 4 x 8
7-682-662-01	screw, ⊕ PS 4 x 10
7-682-947-01	screw, ⊕ PSW 3 x 6
3-701-505-01	set screw, Allen-head 3 x 3
3-701-508-01	set screw, Allen-head 3 x 6
3-701-510-01	set screw, Allen-head 4 x 4
7-683-403-01	screw, Allen-head 3 x 6
3-701-552-11	screw, knurled Allen-head M 3 x 15
3-701-547-01	screw, knurled Allen-head M 3 x 6
7-684-013-01	nut, 3 mm dia
7-684-014-00	nut, 4 mm dia
7-684-024-00	nut, 4 mm dia
7-684-034-00	nut, 4 mm dia

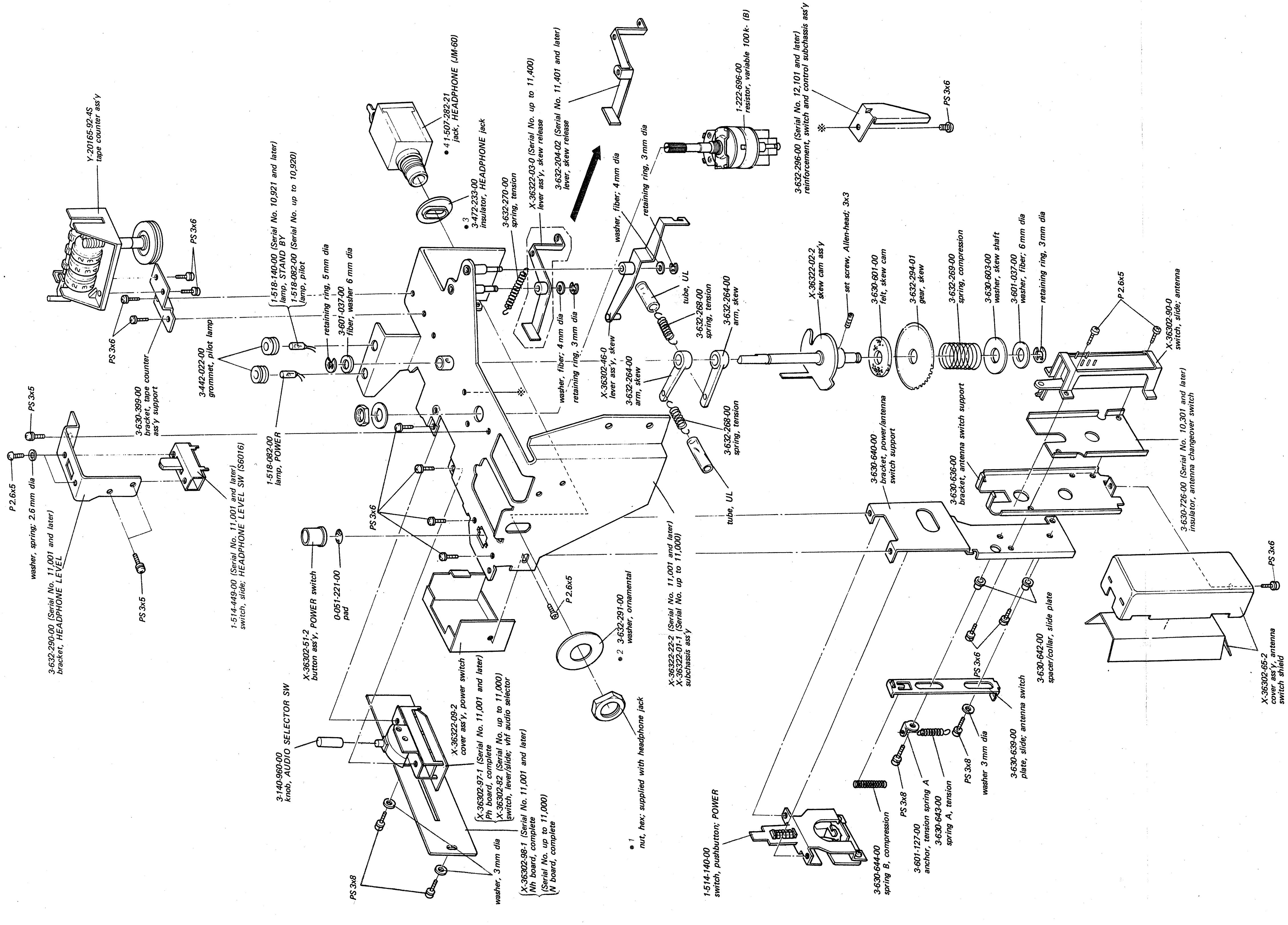
12-3. EXPLODED VIEW (B)


3-630-717-02 (Serial No. 11,001 and later)
3-630-717-01 (Serial No. up to 11,000)
bracket, C board support
Serial No. 11,001 and later
⊕PS 3x6
⊕PS 3x6
3-630-693-00
bracket, C board support
3-632-273-00
bracket, amplok
housing support
3-630-722-00
cover B, F boarf shield
1-508-032-20
housing (white), amplok
1-536-080-11
pin contact, amplok
1-536-080-11
pin contact, amplok
1-508-032-12
housing (red), amplok
3-630-715-01
bracket, wooden case mount
⊕PS 3x6
⊕PS 3x6
⊕P 2.6x5
3-630-373-00
bracket, A board support
⊕PS 3x6
Ⓐ
3-630-401-00
bracket, A board support
3-630-372-00
bracket, K board support
3-630-387-00
bracket, C board support
Serial No. up to 11,000
⊕PS 4x6
⊕PS 3x6
3-630-721-01
cover A, F board shield
⊕PS 3x6
3-632-288-01
plate, shield cover A
3-630-385-00
handle, left
⊕PS 3x6
⊕PS 3x6
⊕PS 4x8
⊕PS 4x8
⊕PS 4x8
⊕PS 3x6
3-630-718-00
bracket, rear panel support
⊕PS 3x6
3-630-391-00
bracket, B board support
3-630-434-00
clamp, lead wire
3-630-393-02
brace, rear
⊕PS 2.6x3
⊕PS 3x6
3-630-388-02 (Serial No. 11,001 and later)
3-630-388-01 (Serial No. up to 11,000)
bracket, rear panel support
⊕PS 4x8
Ⓐ
3-630-811-00
brace, rear bottom
⊕PS 4x8
⊕PS 3x6
⊕K 4x8
screw, knurled Allen-head; 3x6
washer, spring; 3 mm dia
3-630-390-00
bracket, wooden case mount
⊕PS 3x6
3-630-654-00
bracket, antenna switch
support
⊕PS 4x8
⊕PS 3x6
3-630-379-02
bracket, right side;
main chassis ass'y
3-630-377-00
handle, right
3-630-378-02
bracket, main chassis ass'y
(left side)
⊕PS 4x8
X-36302-01-5
chassis ass'y, main
tube, UL
3-630-400-00
bracket, B board support
3-630-402-00
clamp, harness
3-630-392-03
brace, front
3-630-811-00
brace, front bottom
⊕PS 4x8
⊕PS 3x6
washer, 4 mm dia
⊕PS 4x8
3-630-374-02
reinforcement (A), main chassis
⊕PS 3x6
3-630-812-02
reinforcement (D),
main chassis
screw, Allen-head; 4x8
⊕PS 4x8
3-630-383-02
brace (B), main chassis
⊕PS 4x8
1-121-074-11
capacitor, 1,000μF, 50V;
electrolytic: C6005
1-121-985-11
capacitor, 4,000μF, 25V;
electrolytic: C6006
3-630-384-02
brace (C), main chassis
1-113-069-11
capacitor, 2.5μF + 1.2μF,
250V; MP C6004
3-630-395-00
bracket, capacitor mount
⊕PS 3x6

12-4. EXPLODED VIEW (C)

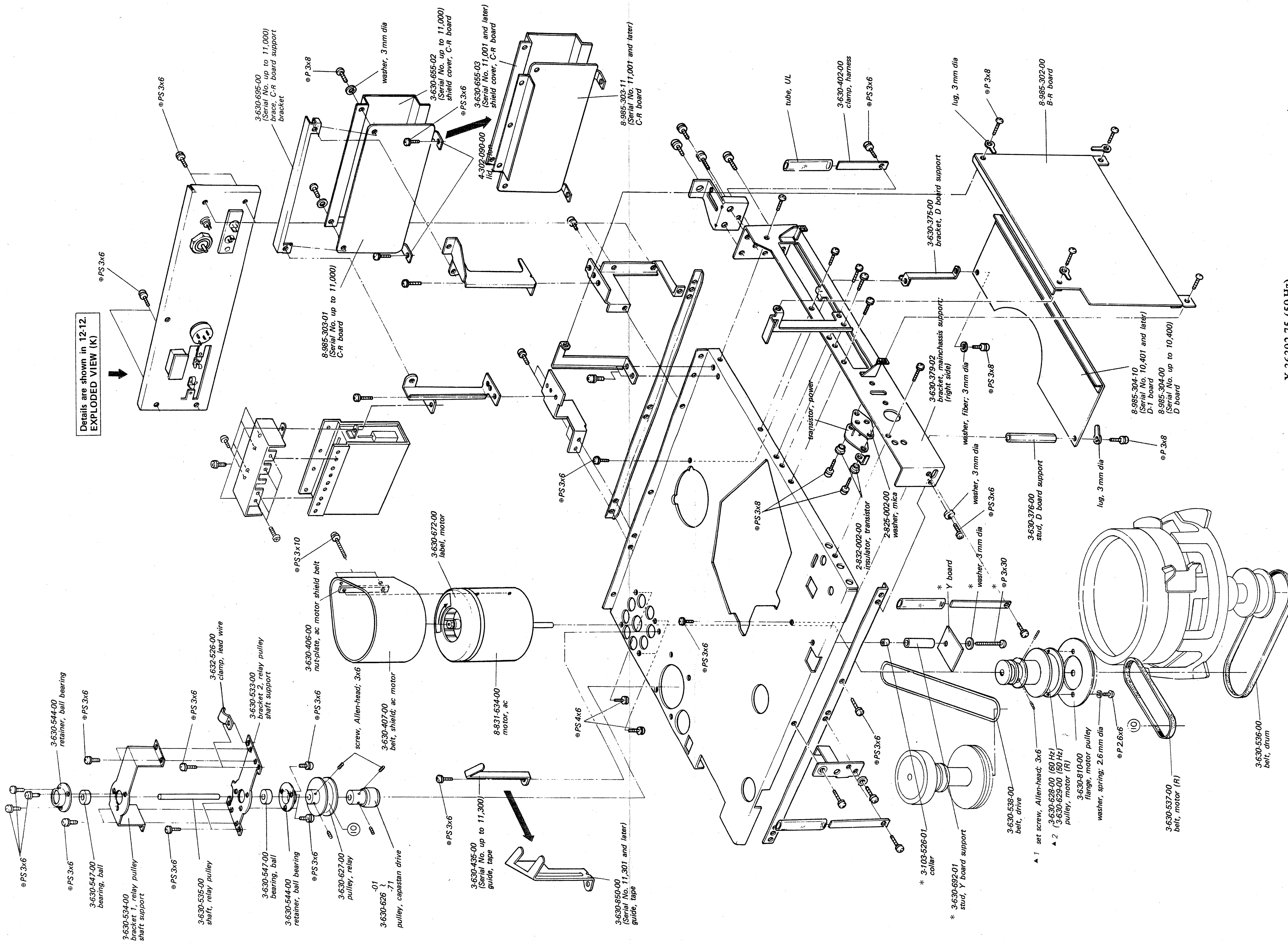

3-630-679-00
washer, rubber
⊕P 3x8
3-630-678-00
collar, A board
washer, 3 mm dia (large)
⊕PS 3x8
8-985-309-00
K board
8-985-301-00
A-R board
washer, fiber 3 mm dia
3-630-686-00
band, rubber
⊕PS 3x6
3-630-680-00
holder, A board
X-36302-78-0
holder ass'y, A-R board
⊕PS 3x6
1-536-329-00
terminal strip, 14-P
tube, UL 8.3x5.5 (mm)
3-630-402-00
clamp, harness
⊕PS 3x6
⊕PS 3x6
1-441-797-00
transformer, power
⊕PS 4x8
⊕PS 3x6
X-36322-22-0
subchassis ass'y, switch and control
(Serial No. 11,001 and later)
⊕PS 3x6
Details are shown in 12-5.
EXPLODED VIEW (D)
nut, 4 mm dia
spring washer, 4 mm dia
⊕PS 3x6
⊕PS 3x6
⊕PS 4x8
washer, 4 mm dia
3-630-590-02 (Serial No. 11,181 and later)
3-630-590-01 (Serial No. up to 11,180)
rod, skew control
X-36322-01-1
subchassis ass'y, switch and control
(Serial No. up to 11,000)
X-36322-25-0
lever ass'y, skew control release
3-632-266-00
rod, skew control release
3-630-600-00
holder, pulling rod
8-985-305-00
E board
⊕P 3x8
washer, fiber; 3 mm dia
⊕PS 3x6

12-5. EXPLODED VIEW (D)


Y-20165-92-4S
tape counter ass'y
PS 3x6
PS 3x6
3-630-399-00
bracket, tape counter ass'y support
3-442-022-00
grommet, pilot lamp
1-518-140-00 (Serial No. 10,921 and later)
lamp, STAND BY
1-518-082-00 (Serial No. up to 10,920)
lamp, pilot
retaining ring, 5 mm dia
3-601-037-00
fiber, washer 6 mm dia
● 4 1-507-282-21
jack, HEADPHONE (JM-60)
● 3
3-472-233-00
insulator, HEADPHONE jack
3-632-270-00
spring, tension
X-36322-03-0 (Serial No. up to 11,400)
lever ass'y, skew release
3-632-204-02 (Serial No. 11,401 and later)
lever, skew release
washer, fiber; 4 mm dia
retaining ring, 3 mm dia
1-222-696-00
resistor, variable 100 k (B)
3-632-296-00 (Serial No. 12,101 and later)
reinforcement, switch and control subchassis ass'y
PS 3x6
washer, fiber; 4 mm dia
retaining ring, 3 mm dia
tube, UL
3-632-268-00
spring, tension
3-632-264-00
arm, skew
X-36302-46-0
lever ass'y, skew
3-632-264-00
arm, skew
3-632-268-00
spring, tension
tube, UL
X-36322-02-2
skew cam ass'y
set screw, Allen-head; 3x3
3-630-601-00
felt, skew cam
3-632-294-01
gear, skew
3-632-269-00
spring, compression
3-630-603-00
washer, skew shaft
3-601-037-00
washer, fiber; 6 mm dia
retaining ring, 3 mm dia
P 2.6x5
X-36302-90-0
switch, slide; antenna
PS 3x5
P 2.6x5
washer, spring; 2.6 mm dia
3-632-290-00 (Serial No. 11,001 and later)
bracket, HEADPHONE LEVEL
PS 3x5
1-514-449-00 (Serial No. 11,001 and later)
switch, slide; HEADPHONE LEVEL SW (S6016)
1-518-082-00
lamp, POWER
PS 3x6
X-36302-51-2
button ass'y, POWER switch
0-051-221-00
pad
P 2.6x5
● 2 3-632-291-00
washer, ornamental
X-36322-22-2 (Serial No. 11,001 and later)
X-36322-01-1 (Serial No. up to 11,000)
subchassis ass'y
3-630-640-00
bracket, power/antenna switch support
3-630-636-00
bracket, antenna switch support
3-630-726-00 (Serial No. 10,301 and later)
insulator, antenna changeover switch
PS 3x6
X-36302-65-2
cover ass'y, antenna switch shield
PS 3x6
3-630-642-00
spacer(collar), slide plate
3-630-639-00
plate, slide; antenna switch
washer 3 mm dia
PS 3x8
3-630-643-00
spring A, tension
3-601-127-00
anchor, tension spring A
PS 3x8
3-630-644-00
spring B, compression
1-514-140-00
switch, pushbutton; POWER
● 1
nut, hex; supplied with headphone jack
3-140-960-00
knob, AUDIO SELECTOR SW
X-36322-09-2
cover ass'y, power switch
X-36302-97-1 (Serial No. 11,001 and later)
Ph board, complete
X-36302-82 (Serial No. up to 11,000)
switch, lever/slide; vhf audio selector
X-36302-98-1 (Serial No. 11,001 and later)
Nh board, complete
(Serial No. up to 11,000)
N board, complete
washer, 3 mm dia
PS 3x8

Note: ● 1 ~ 4 are for Serial Number 11,001 and later.

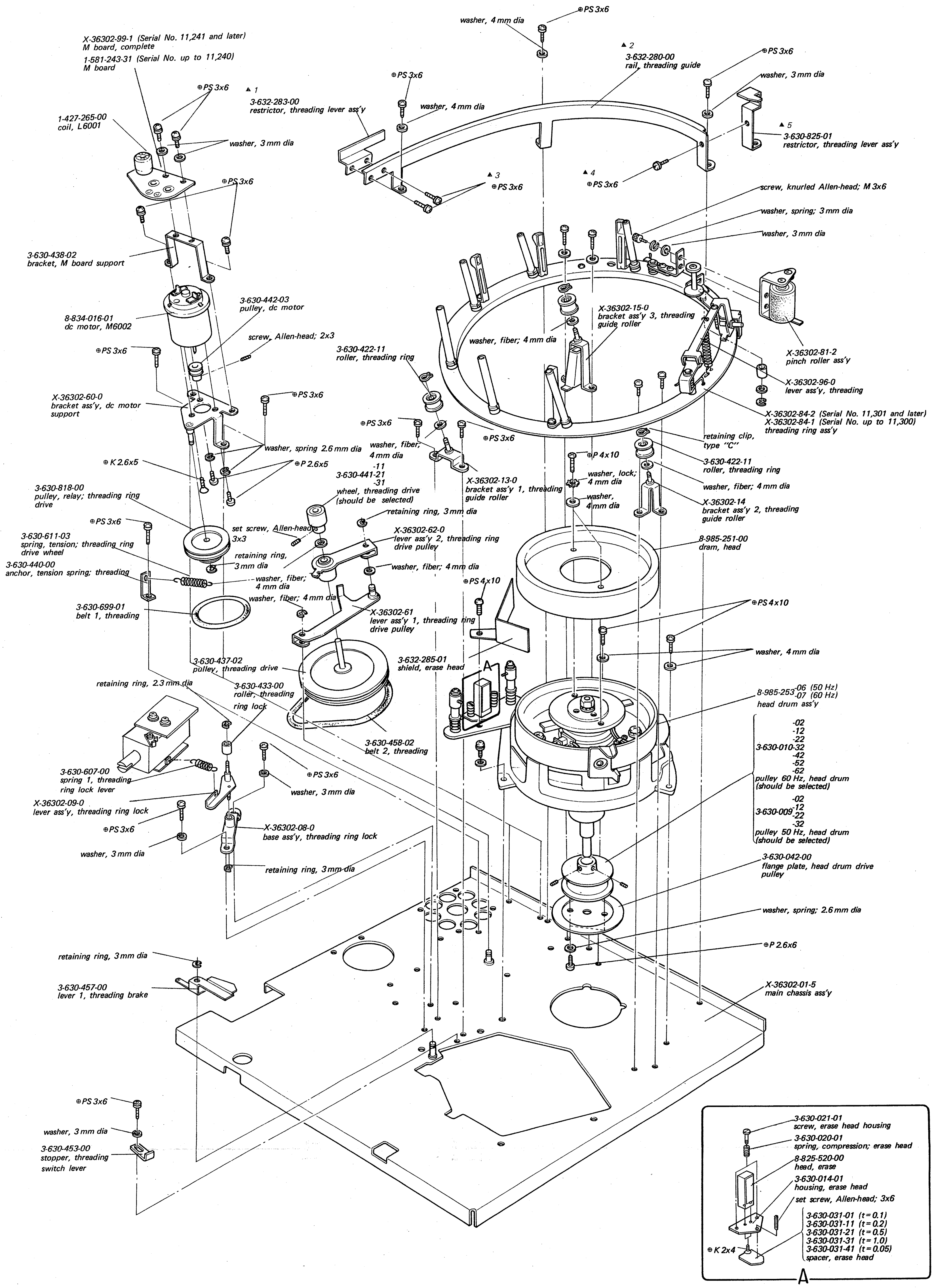
12-6. EXPLODED VIEW (E)


Details are shown in 12-12. EXPLODED VIEW (K)
⊕PS 3x6
⊕PS 3x6
3-630-695-00 (Serial No. up to 11,000) brace, C-R board support bracket
⊕P 3x8
washer, 3 mm dia
3-630-655-02 (Serial No. up to 11,000) shield cover, C-R board
⊕PS 3x6
4-302-090-00 lid, fuse
3-630-655-03 (Serial No. 11,001 and later) shield cover, C-R board
8-985-303-11 (Serial No. 11,001 and later) C-R board
8-985-303-01 (Serial No. up to 11,000) C-R board
tube, UL
3-630-402-00 clamp, harness
⊕PS 3x6
lug, 3 mm dia
⊕P 3x8
8-985-302-00 B-R board
3-630-375-00 bracket, D board support
3-630-379-02 bracket, mainchassis support (right side)
transistor, power
washer, fiber; 3 mm dia
⊕PS 3x8
8-985-304-10 (Serial No. 10,401 and later) D-1 board
8-985-304-00 (Serial No. up to 10,400) D board
⊕P 3x8
lug, 3 mm dia
3-630-376-00 stud, D board support
washer, 3 mm dia
⊕PS 3x6
⊕PS 3x8
2-832-002-00 insulator, transistor
2-825-002-00 washer, mica
⊕PS 3x6
⊕PS 3x10
3-630-672-00 label, motor
3-630-406-00 nut-plate, ac motor shield belt
3-630-407-00 belt, shield; ac motor
screw, Allen-head; 3x6
8-831-634-00 motor, ac
⊕PS 3x6
⊕PS 4x6
* Y board
* washer, 3 mm dia
* ⊕P 3x30
⊕PS 3x6
3-632-526-00 clamp, lead wire
3-630-533-00 bracket 2, relay pulley shaft support
⊕PS 3x6
⊕PS 3x6
3-630-544-00 retainer, ball bearing
⊕PS 3x6
⊕PS 3x6
⊕PS 3x6
3-630-547-00 bearing, ball
3-630-534-00 bracket 1, relay pulley shaft support
⊕PS 3x6
3-630-535-00 shaft, relay pulley
3-630-547-00 bearing, ball
3-630-544-00 retainer, ball bearing
⊕PS 3x6
3-630-627-00 pulley, relay
3-630-626-01 ~ -71 pulley, capstan drive
⊕PS 3x6
3-630-435-00 (Serial No. up to 11,300) guide, tape
3-630-850-00 (Serial No. 11,301 and later) guide, tape
* 3-103-526-01 collar
* 3-630-692-01 stud, Y board support
3-630-538-00 belt, drive
▲1 set screw, Allen-head; 3x6
▲2 3-630-628-00 (60 Hz) 3-630-629-00 (50 Hz) pulley, motor (R)
3-630-810-00 flange, motor pulley
washer, spring; 2.6 mm dia
⊕P 2.6x6
3-630-537-00 belt, motor (R)
3-630-536-00 belt, drum

Note: ▲1 ~ 2 X-36302-75 (50 Hz) X-36302-76 (60 Hz) includes all the parts marked ▲.

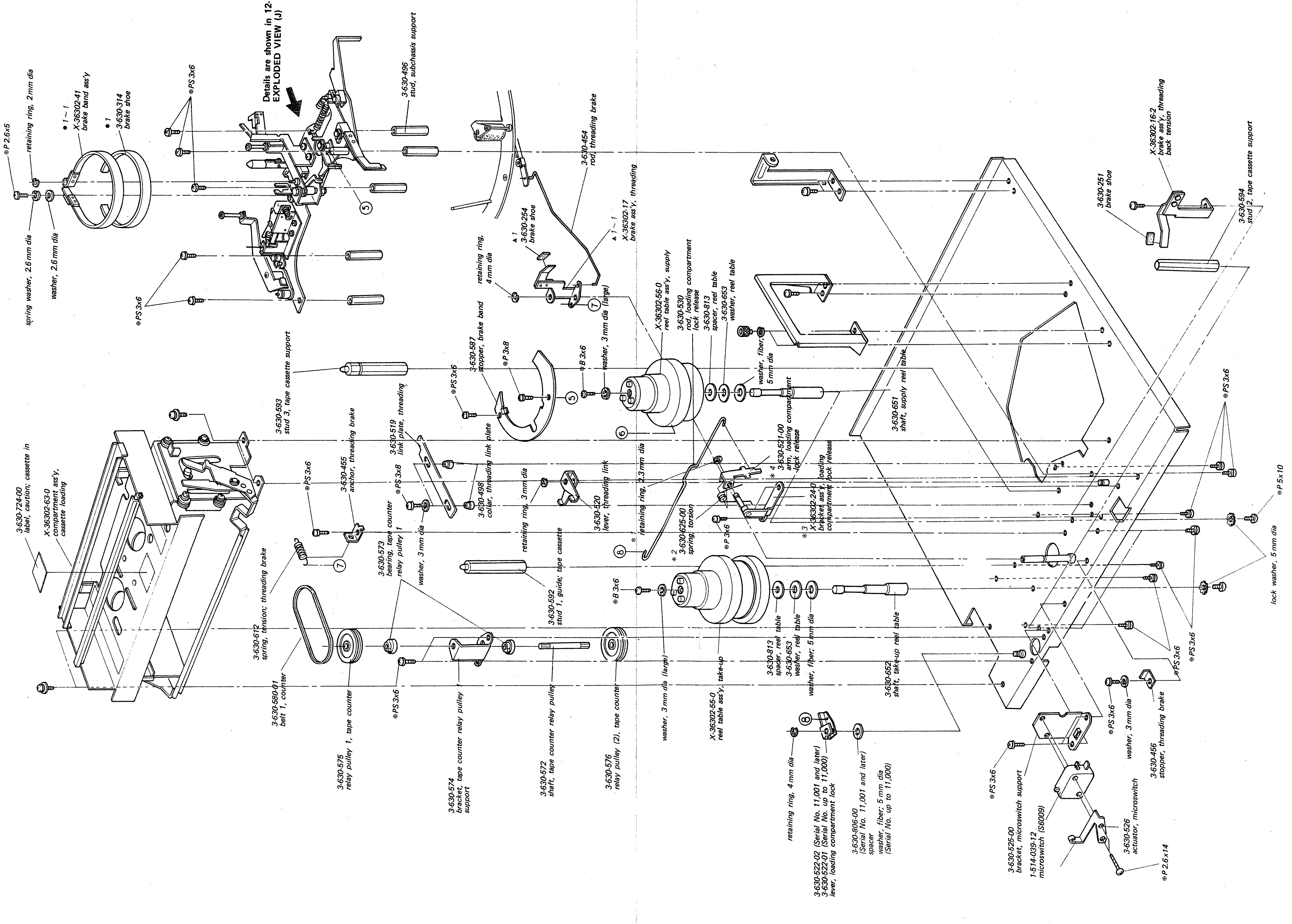
All the parts marked * are for serial No. up to 10,400.

12-7. EXPLODED VIEW (F)


⊕PS 3x6
washer, 4 mm dia
▲2
3-632-280-00
rail, threading guide
⊕PS 3x6
washer, 3 mm dia
▲5
3-630-825-01
restrictor, threading lever ass'y
X-36302-99-1 (Serial No. 11,241 and later)
M board, complete
1-581-243-31 (Serial No. up to 11,240)
M board
⊕PS 3x6
▲1
3-632-283-00
restrictor, threading lever ass'y
⊕PS 3x6
washer, 4 mm dia
1-427-265-00
coil, L6001
washer, 3 mm dia
▲3
⊕PS 3x6
▲4
⊕PS 3x6
⊕PS 3x6
screw, knurled Allen-head; M 3x6
washer, spring; 3 mm dia
washer, 3 mm dia
3-630-438-02
bracket, M board support
3-630-442-03
pulley, dc motor
8-834-016-01
dc motor, M6002
X-36302-15-0
bracket ass'y 3, threading guide roller
screw, Allen-head; 2x3
washer, fiber; 4 mm dia
3-630-422-11
roller, threading ring
⊕PS 3x6
X-36302-81-2
pinch roller ass'y
X-36302-96-0
lever ass'y, threading
X-36302-60-0
bracket ass'y, dc motor support
⊕PS 3x6
⊕PS 3x6
⊕PS 3x6
X-36302-84-2 (Serial No. 11,301 and later)
X-36302-84-1 (Serial No. up to 11,300)
threading ring ass'y
washer, spring 2.6 mm dia
washer, fiber; 4 mm dia
retaining clip, type "C"
⊕K 2.6x5
⊕P 2.6x5
-11
3-630-441-21
-31
wheel, threading drive (should be selected)
X-36302-13-0
bracket ass'y 1, threading guide roller
⊕P 4x10
3-630-422-11
roller, threading ring
washer, lock; 4 mm dia
washer, fiber; 4 mm dia
washer, 4 mm dia
X-36302-14
bracket ass'y 2, threading guide roller
3-630-818-00
pulley, relay; threading ring drive
⊕PS 3x6
retaining ring, 3 mm dia
set screw, Allen-head; 3x3
X-36302-62-0
lever ass'y 2, threading ring drive pulley
8-985-251-00
dram, head
3-630-611-03
spring, tension; threading ring drive wheel
retaining ring, 3 mm dia
3-630-440-00
anchor, tension spring; threading
washer, fiber; 4 mm dia
washer, fiber; 4 mm dia
⊕PS 4x10
⊕PS 4x10
washer, fiber; 4 mm dia
3-630-699-01
belt 1, threading
X-36302-61
lever ass'y 1, threading ring drive pulley
washer, 4 mm dia
3-630-437-02
pulley, threading drive
3-632-285-01
shield, erase head
A
retaining ring, 2.3 mm dia
3-630-433-00
roller, threading ring lock
8-985-253-06 (50 Hz)
-07 (60 Hz)
head drum ass'y
-02
-12
-22
3-630-010-32
-42
-52
-62
pulley 60 Hz, head drum (should be selected)
3-630-458-02
belt 2, threading
⊕PS 3x6
3-630-607-00
spring 1, threading ring lock lever
washer, 3 mm dia
-02
-12
3-630-009-22
-32
pulley 50 Hz, head drum (should be selected)
X-36302-09-0
lever ass'y, threading ring lock
⊕PS 3x6
X-36302-08-0
base ass'y, threading ring lock
washer, 3 mm dia
retaining ring, 3 mm dia
3-630-042-00
flange plate, head drum drive pulley
washer, spring; 2.6 mm dia
retaining ring, 3 mm dia
⊕P 2.6x6
3-630-457-00
lever 1, threading brake
X-36302-01-5
main chassis ass'y
⊕PS 3x6
washer, 3 mm dia
3-630-453-00
stopper, threading switch lever
3-630-021-01
screw, erase head housing
3-630-020-01
spring, compression; erase head
8-825-520-00
head, erase
3-630-014-01
housing, erase head
set screw, Allen-head; 3x6
3-630-031-01 (t = 0.1)
3-630-031-11 (t = 0.2)
3-630-031-21 (t = 0.5)
3-630-031-31 (t = 1.0)
3-630-031-41 (t = 0.05)
spacer, erase head
⊕K 2x4
A

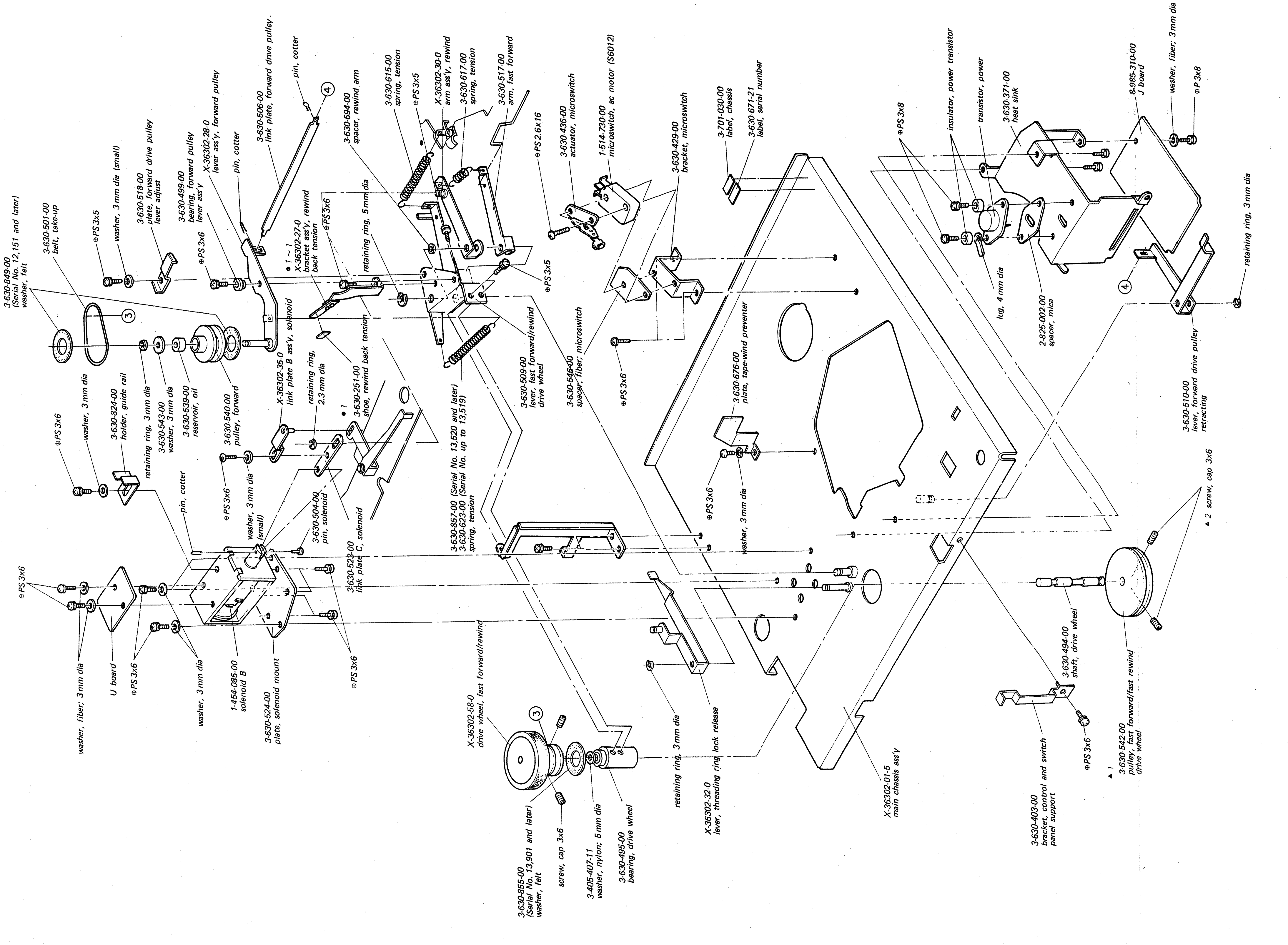
Note: ▲1 ~ 5 threading guide rail ass'y (X-36322-24-0) includes all the parts marked ▲.

12-8. EXPLODED VIEW (G)


Details are shown in 12-11. EXPLODED VIEW (J)
3-630-496 stud, subchassis support
⊕P 2.6x5
retaining ring, 2mm dia
● 1 ~ 1 X-36302-41 brake band ass'y
● 1 3-630-314 brake shoe
⊕PS 3x6
spring washer, 2.6 mm dia
washer, 2.6 mm dia
⊕PS 3x6
⑤
3-630-454 rod, threading brake
▲1 ~ 1 X-36302-17 brake ass'y, threading
▲1 3-630-254 brake shoe
retaining ring, 4mm dia
⑦
washer, 3 mm dia (large)
X-36302-56-0 reel table ass'y, supply
3-630-530 rod, loading compartment lock release
3-630-813 spacer, reel table
3-630-653 washer, reel table
washer, fiber, 5 mm dia
3-630-651 shaft, supply reel table
3-630-251 brake shoe
X-36302-16-2 brake ass'y, threading back tension
3-630-594 stud 2, tape cassette support
3-630-593 stud 3, tape cassette support
⊕PS 3x6
3-630-587 stopper, brake band
⊕P 3x8
⑤
⊕B 3x6
⑥
3-630-724-00 label, caution; cassette in
X-36302-63-0 compartment ass'y, cassette loading
⊕PS 3x6
3-630-455 anchor, threading brake
3-630-519 link plate, threading
⊕PS 3x8
3-630-498 collar, threading link plate
retaining ring, 3mm dia
3-630-520 lever, threading link
retaining ring, 2.3mm dia
* 4 3-630-521-00 arm, loading compartment lock release
* 3 X-36302-24-0 bracket ass'y, loading compartment lock release
* 2 3-630-625-00 spring, torsion
⊕P 3x6
⑧
⊕PS 3x6
⊕P 5x10
lock washer, 5 mm dia
⑦
3-630-573 bearing, tape counter relay pulley 1
washer, 3 mm dia
3-630-612 spring, tension; threading brake
3-630-592 stud 1, guide; tape cassette
⊕B 3x6
3-630-580-01 belt 1, counter
3-630-575 relay pulley 1, tape counter
⊕PS 3x6
3-630-574 bracket, tape counter relay pulley support
3-630-572 shaft, tape counter relay pulley
3-630-576 relay pulley (2), tape counter
washer, 3 mm dia (large)
X-36302-55-0 reel table ass'y, take-up
3-630-813 spacer, reel table
3-630-653 washer, reel table
washer, fiber; 5 mm dia
3-630-652 shaft, take-up reel table
⑧
retaining ring, 4mm dia
3-630-522-02 (Serial No. 11,001 and later)
3-630-522-01 (Serial No. up to 11,000)
lever, loading compartment lock
3-630-806-00 (Serial No. 11,001 and later)
spacer
washer, fiber; 5 mm dia
(Serial No. up to 11,000)
⊕PS 3x6
3-630-525-00 bracket, microswitch support
1-514-039-12 microswitch (S6009)
3-630-526 actuator, microswitch
⊕P 2.6x14
⊕PS 3x6
washer, 3mm dia
3-630-456 stopper, threading brake
⊕PS 3x6
⊕PS 3x6

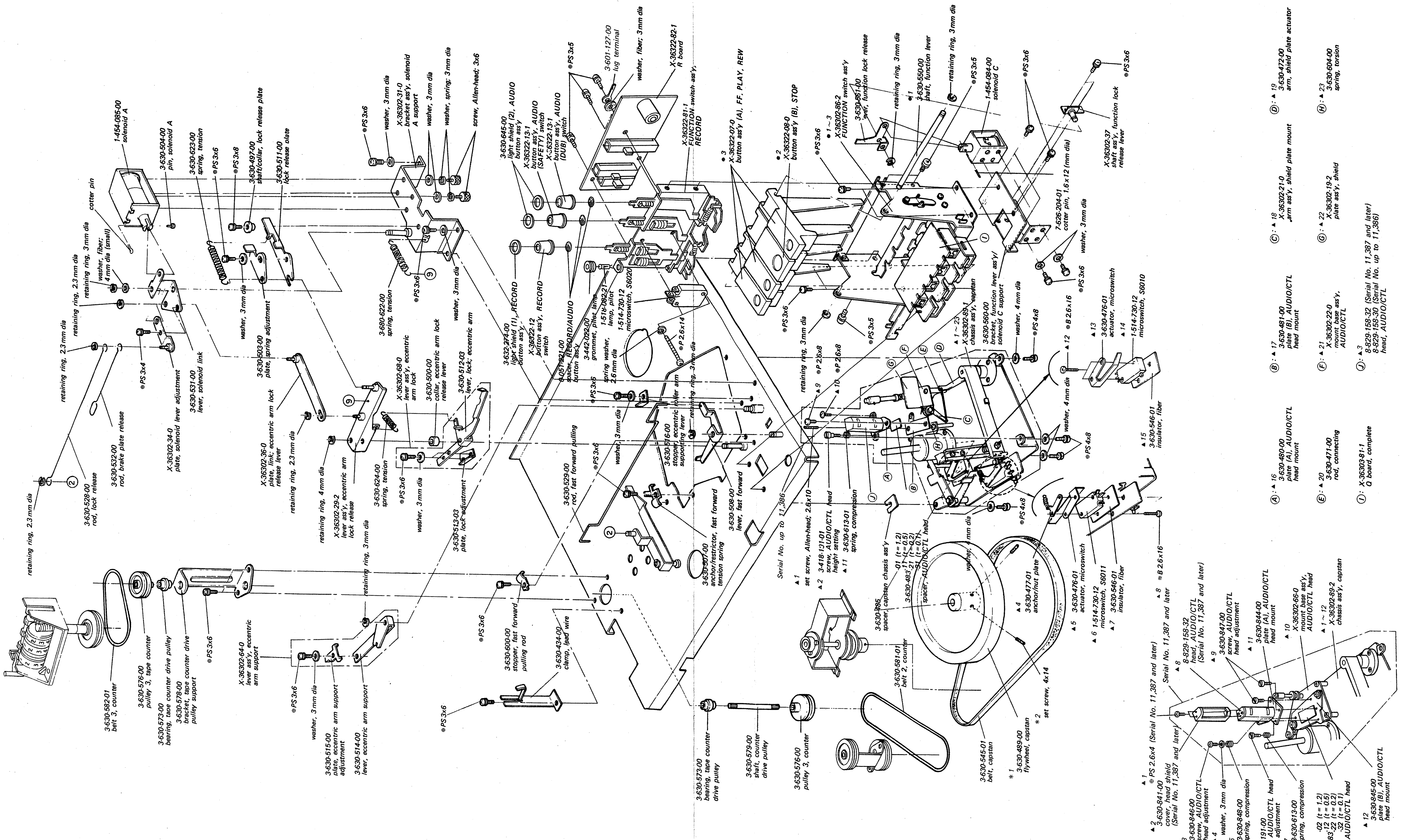
Note: ● 1 ~ 1 brake band ass'y includes all the parts marked ●.
▲ 1 ~ 1 brake ass'y, threading includes all the parts marked ▲.
* 1 ~ 4 arm ass'y, loading compartment lock release (X-36302-67-0) includes all the parts marked *.

12-9. EXPLODED VIEW (H)


3-630-849-00 (Serial No. 12,151 and later) washer, felt
3-630-501-00 belt, take-up
⊕PS 3x5
washer, 3 mm dia (small)
3-630-518-00 plate, forward drive pulley lever adjust
3-630-499-00 bearing, forward pulley lever ass'y
X-36302-28-0 lever ass'y, forward pulley
⊕PS 3x6
pin, cotter
3-630-506-00 link plate, forward drive pulley
pin, cotter
④
● 1 ~ 1 X-36302-27-0 bracket ass'y, rewind back tension
⊕PS 3x6
3-630-694-00 spacer, rewind arm
retaining ring, 5 mm dia
3-630-615-00 spring, tension
⊕PS 3x5
X-36302-30-0 arm ass'y, rewind
3-630-617-00 spring, tension
3-630-517-00 arm, fast forward
⊕PS 2.6x16
3-630-436-00 actuator, microswitch
1-514-730-00 microswitch, ac motor (S6012)
3-630-429-00 bracket, microswitch
3-701-030-00 label, chassis
3-630-671-21 label, serial number
⊕PS 3x8
insulator, power transistor
transistor, power
3-630-371-00 heat sink
8-985-310-00 J board
washer, fiber; 3 mm dia
⊕P 3x8
retaining ring, 3 mm dia
④
lug, 4 mm dia
2-825-002-00 spacer, mica
3-630-510-00 lever, forward drive pulley retracting
▲2 screw, cap 3x6
⊕PS 3x5
3-630-546-00 spacer, fiber; microswitch
3-630-509-00 lever, fast forward/rewind drive wheel
⊕PS 3x6
3-630-676-00 plate, tape-wind preventer
⊕PS 3x6
washer, 3 mm dia
3-630-857-00 (Serial No. 13,520 and later) 3-630-623-00 (Serial No. up to 13,519) spring, tension
X-36302-35-0 link plate B ass'y, solenoid
retaining ring, 2.3 mm dia
● 1 3-630-251-00 shoe, rewind back tension
③
⊕PS 3x6
washer, 3 mm dia
3-630-824-00 holder, guide rail
retaining ring, 3 mm dia
3-630-543-00 washer, 3 mm dia
3-630-539-00 reservoir, oil
3-630-540-00 pulley, forward
pin, cotter
⊕PS 3x6
washer, 3 mm dia (small)
3-630-504-00 pin, solenoid
3-630-523-00 link plate C, solenoid
⊕PS 3x6
washer, fiber; 3 mm dia
U board
⊕PS 3x6
washer, 3 mm dia
1-454-085-00 solenoid B
3-630-524-00 plate, solenoid mount
⊕PS 3x6
X-36302-58-0 drive wheel, fast forward/rewind
③
3-630-855-00 (Serial No. 13,901 and later) washer, felt
screw, cap 3x6
3-405-407-11 washer, nylon; 5 mm dia
3-630-495-00 bearing, drive wheel
retaining ring, 3 mm dia
X-36302-32-0 lever, threading ring lock release
X-36302-01-5 main chassis ass'y
3-630-403-00 bracket, control and switch panel support
⊕PS 3x6
3-630-494-00 shaft, drive wheel
▲1 3-630-542-00 pulley, fast forward/fast rewind drive wheel

Note: ▲1 ~ 2 X-36302-77-0 (pulley ass'y, fast forward/rewind drive wheel) includes all the parts marked ▲.
● 1 ~ 1 bracket ass'y, rewind back tension includes all the parts marked ●.

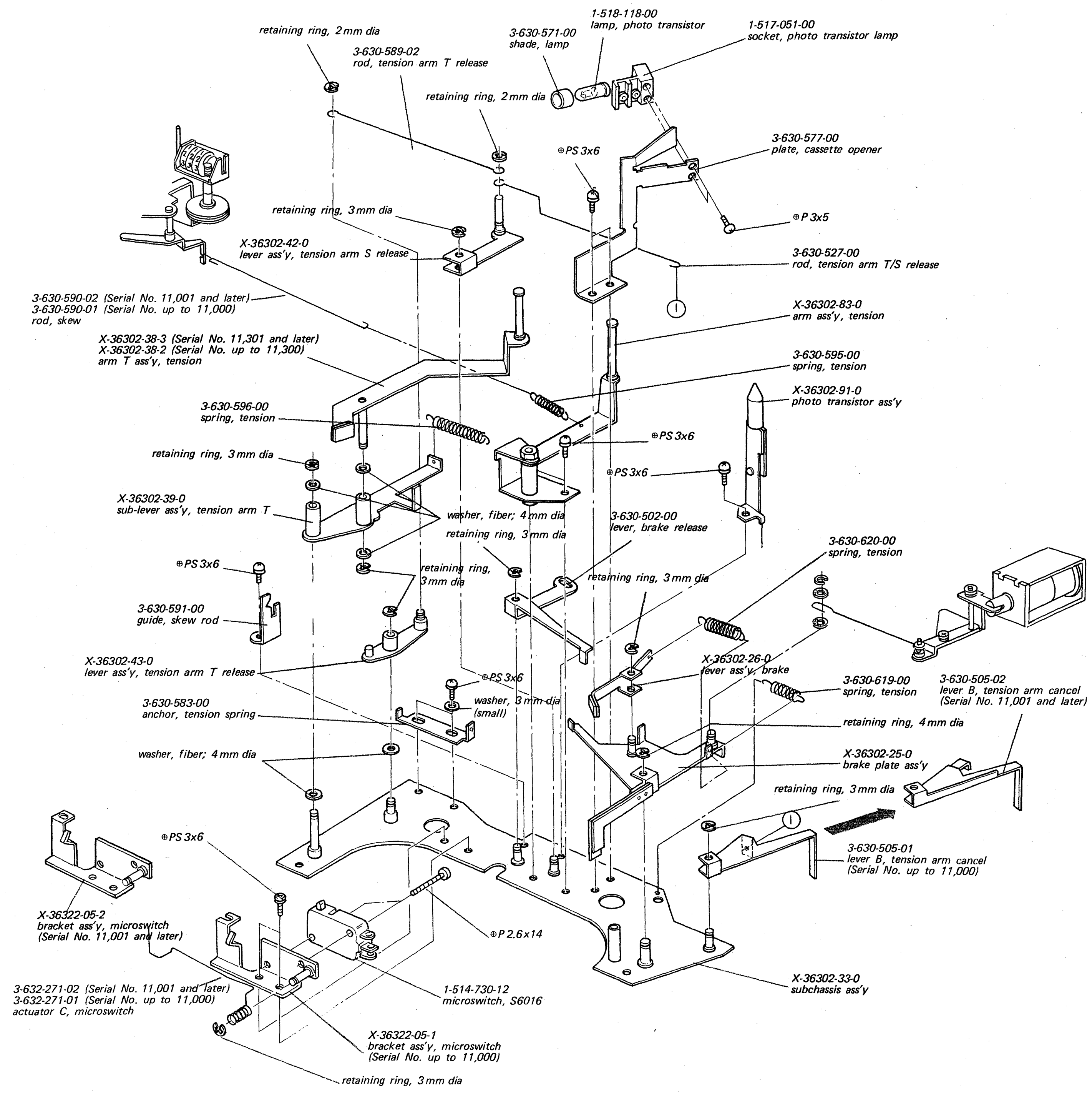
12-10. EXPLODED VIEW (I)


3-630-582-01 belt 3, counter
3-630-576-00 pulley 3, tape counter
3-630-573-00 bearing, tape counter drive pulley
3-630-578-00 bracket, tape counter drive pulley support
⊕PS 3x6
X-36302-64-0 lever ass'y, eccentric arm support
⊕PS 3x6
washer, 3 mm dia
3-630-515-00 plate, eccentric arm support adjustment
3-630-514-00 lever, eccentric arm support
⊕PS 3x6
retaining ring, 2.3 mm dia
3-630-528-00 rod, lock release
3-630-532-00 rod, brake plate release
retaining ring, 2.3 mm dia
retaining ring, 2.3 mm dia
retaining ring, 3 mm dia
washer, fiber; 4 mm dia (small)
cotter pin
1-454-085-00 solenoid A
3-630-504-00 pin, solenoid A
3-630-623-00 spring, tension
⊕PS 3x6
⊕PS 3x8
3-630-497-00 shaft/collar, lock release plate
3-630-511-00 lock release plate
⊕PS 3x4
X-36302-34-0 plate, solenoid lever adjustment
3-630-531-00 lever, solenoid link
washer, 3 mm dia
3-630-503-00 plate, spring adjustment
X-36302-36-0 plate, link; eccentric arm lock release lever
retaining ring, 2.3 mm dia
retaining ring, 4 mm dia
X-36302-29-2 lever ass'y, eccentric arm lock release
retaining ring, 3 mm dia
3-630-624-00 spring, tension
⊕PS 3x6
washer, 3 mm dia
3-630-513-03 plate, lock adjustment
3-680-622-00 spring, tension
⊕PS 3x6
X-36302-68-0 lever ass'y, eccentric arm lock
3-630-500-00 collar, eccentric arm release lever
3-630-512-03 lever, lock; eccentric arm
washer, 3 mm dia
⊕PS 3x6
washer, 3 mm dia
X-36302-31-0 bracket ass'y, solenoid A support
washer, 3 mm dia
washer, spring; 3 mm dia
screw, Allen-head; 3x6
⊕PS 3x6
3-630-600-00 stopper, fast forward pulling rod
3-630-434-00 clamp, lead wire
⊕PS 3x6
3-630-529-00 rod, fast forward pulling
⊕PS 3x6
3-630-645-00 light shield (2), AUDIO button ass'y
X-36322-13-1 button ass'y, AUDIO (SAFETY) switch
X-36322-13-1 button ass'y, AUDIO (DUB) switch
⊕PS 3x5
3-601-127-00 lug terminal
washer, fiber; 3 mm dia
X-36322-82-1 R board
X-36322-81-1 FUNCTION switch ass'y, RECORD
3-632-274-00 light shield (1), button ass'y
X-36322-12 button ass'y, RECORD switch
RECORD
3-630-521-00 spacer, RECORD/AUDIO button ass'y
3-442-089-00 grommet, pilot lamp
1-518-082-21 lamp, pilot
1-514-730-12 microswitch, S6020
spring washer, 2.6 mm dia
⊕P 2.6x14
⊕PS 3x6
3-630-516-00 stopper, eccentric roller arm supporting lever
retaining ring, 3 mm dia
washer, 3 mm dia
3-630-507-00 anchor/restrictor, fast forward tension spring
3-630-508-00 lever, fast forward
●3 X-36322-07-0 button ass'y (A), FF, PLAY, REW
●2 X-36322-08-0 button ass'y (B), STOP
⊕PS 3x6
●1 ~ 3 X-36302-86-2 FUNCTION switch ass'y
3-630-551-00 lever, function lock release
retaining ring, 3 mm dia
3-630-550-00 shaft, function lever
retaining ring, 3 mm dia
⊕PS 3x5
1-454-084-00 solenoid C
⊕PS 3x6
⊕PS 3x6
X-36302-37 shaft ass'y, function lock release lever
7-626-204-01 cotter pin, 1.6x12 (mm dia)
washer, 3 mm dia
⊕PS 3x6
⊕PS 3x6
⊕PS 3x5
retaining ring, 3 mm dia
⊕P 2.6x8
⊕P 2.6x8
▲1 ~ 23 X-36302-89-1 chassis ass'y, capstan
3-630-560-00 bracket, function lever ass'y/ solenoid C support
washer, 4 mm dia
⊕PS 4x8
▲12 ⊕B 2.6x16
▲13 3-630-476-01 actuator, microswitch
▲14 1-514-730-12 microswitch, S6010
▲15 3-630-546-01 insulator, fiber
washer, 4 mm dia
⊕PS 4x8
▲9
▲10
Serial No. up to 11,386
▲1 set screw, Allen-head; 2.6x10
▲2 3-418-191-01 screw, AUDIO/CTL head height setting
▲11 3-630-613-01 spring, compression
▲3 3-630-486 spacer, capstan chassis ass'y
-01 (t=1.2) -11 (t=0.5) 3-630-483-21 (t=0.2) -31 (t=0.1) spacer, AUDIO/CTL head
⊕PS 4x8
washer, 4 mm dia
▲4 3-630-477-01 anchor/nut plate
▲5 3-630-476-01 actuator, microswitch
▲6 1-514-730-12 microswitch, S6011
▲7 3-630-546-01 insulator, fiber
▲8 ⊕B 2.6x16
3-630-581-01 belt 2, counter
3-630-545-01 belt, capstan
*1 3-630-489-00 flywheel, capstan
*2 set screw, 4x14
3-630-572-00 bearing, tape counter drive pulley
3-630-579-00 shaft, counter drive pulley
3-630-576-00 pulley 3, counter
▲1 ⊕PS 2.6x4 (Serial No. 11,387 and later)
▲2 3-630-841-00 cover, head shield (Serial No. 11,387 and later)
▲3 3-630-846-00 screw, AUDIO/CTL head adjustment
▲4 washer, 3 mm dia
▲5 3-630-848-00 spring, compression
▲6 3-418-191-00 screw, AUDIO/CTL head height adjustment
▲7 3-630-613-00 spring, compression
-02 (t=1.2) 3-630-483-12 (t=0.5) -22 (t=0.2) -32 (t=0.1) spacer, AUDIO/CTL head
▲12 3-630-845-00 plate (B), AUDIO/CTL head mount
Serial No. 11,387 and later
▲8 8-829-158-32 head, AUDIO/CTL (Serial No. 11,387 and later)
▲9 3-630-847-00 screw, AUDIO/CTL head adjustment
▲11 3-630-844-00 plate (A), AUDIO/CTL head mount
▲10 X-36302-66-0 mount base ass'y, AUDIO/CTL head
▲1 ~ 12 X-36302-89-2 chassis ass'y, capstan
Ⓐ: ▲16 3-630-480-00 plate (A), AUDIO/CTL head mount
Ⓑ: ▲17 3-630-481-00 plate (B), AUDIO/CTL head mount
Ⓒ: ▲18 X-36302-21-0 arm ass'y, shield plate mount
Ⓓ: ▲19 3-630-472-00 arm, shield plate actuator
Ⓔ: ▲20 3-630-471-00 rod, connecting
Ⓕ: ▲21 X-36302-22-0 mount base ass'y, AUDIO/CTL
Ⓖ: ▲22 X-36302-19-2 plate ass'y, shield
Ⓗ: ▲23 3-630-604-00 spring, torsion
Ⓘ: X-36303-81-1 Q board, complete
Ⓙ: ▲3 8-829-158-32 (Serial No. 11,387 and later) 8-829-158-30 (Serial No. up to 11,386) head, AUDIO/CTL

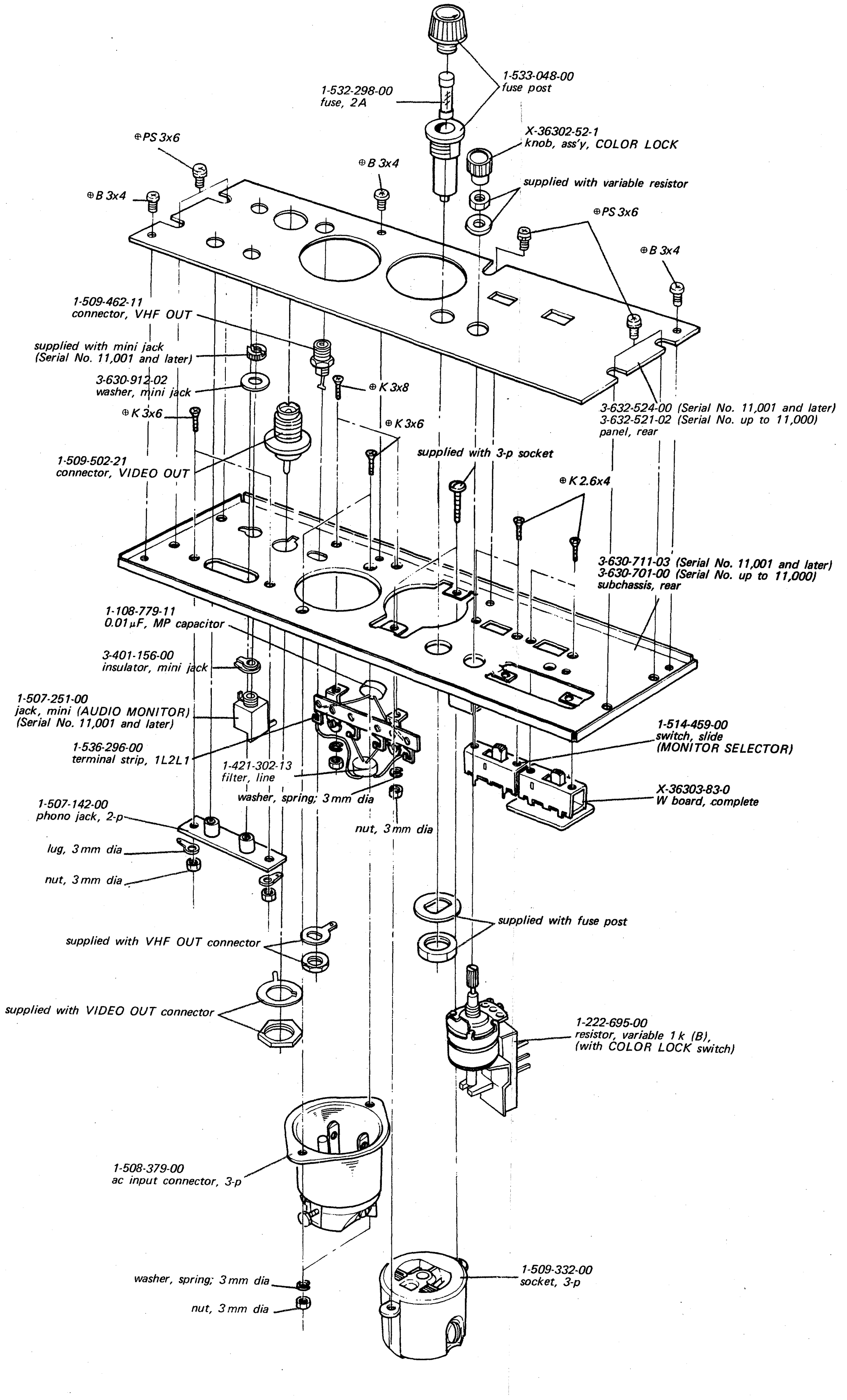
Note: ▲1 ~ 23 Capstan chassis ass'y (X-36302-89-1) includes all the parts marked ▲.
●1 ~ 3 Function switch ass'y (X-36302-86-2) includes all the parts marked ●.
*1 ~ 2 flywheel ass'y (X-36302-74-0) includes all the parts marked *.

Note: ▲1 ~ 12 Capstan chassis ass'y (X-36302-89-2) includes all the parts marked ▲ and micro switches as shown in the former serial number illustrations.

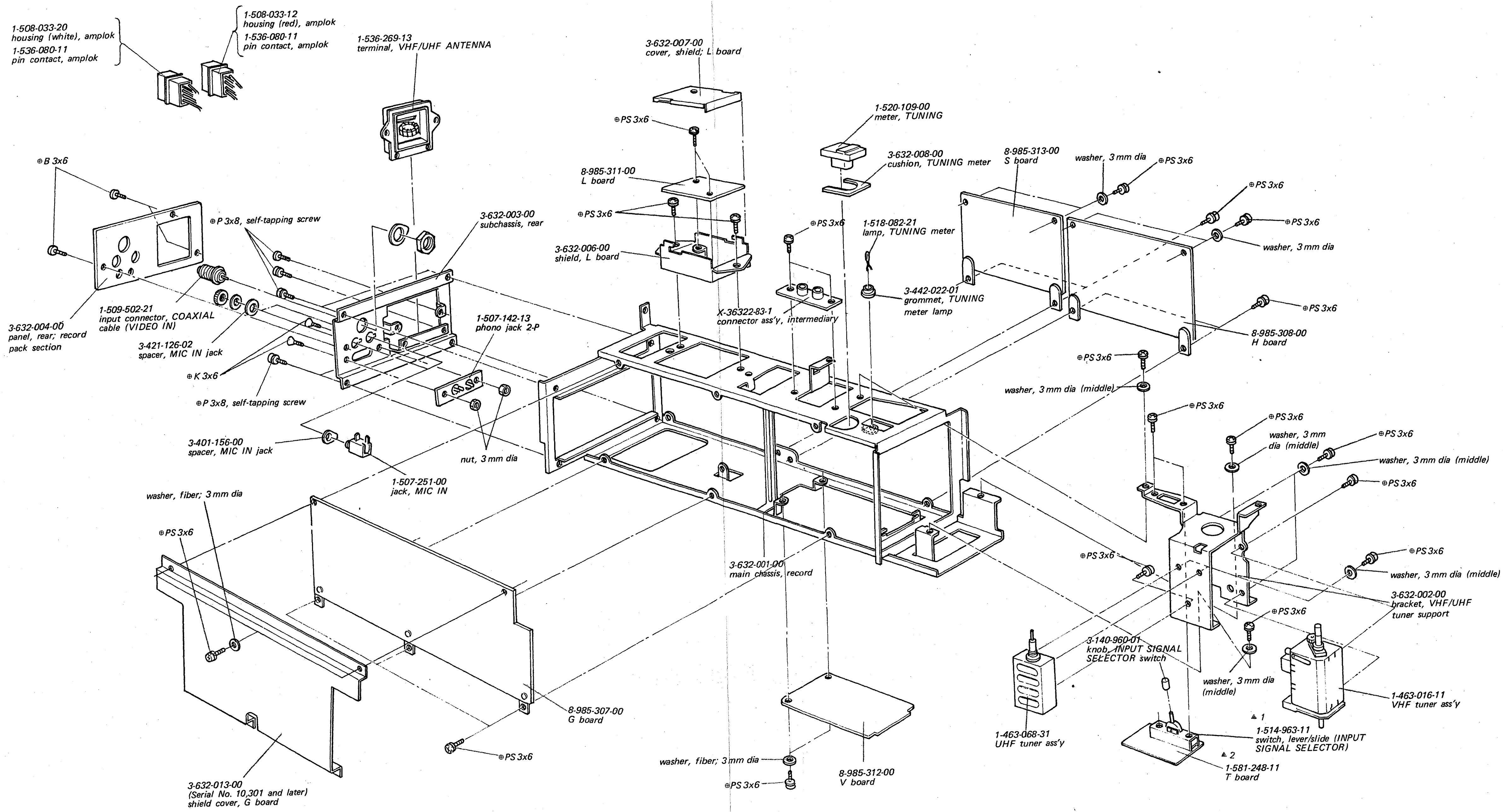
12-11. EXPLODED VIEW (J)


retaining ring, 2mm dia
3-630-589-02
rod, tension arm T release
3-630-571-00
shade, lamp
1-518-118-00
lamp, photo transistor
1-517-051-00
socket, photo transistor lamp
retaining ring, 2mm dia
⊕PS 3x6
3-630-577-00
plate, cassette opener
retaining ring, 3mm dia
⊕P 3x5
X-36302-42-0
lever ass'y, tension arm S release
3-630-527-00
rod, tension arm T/S release
I
3-630-590-02 (Serial No. 11,001 and later)
3-630-590-01 (Serial No. up to 11,000)
rod, skew
X-36302-83-0
arm ass'y, tension
X-36302-38-3 (Serial No. 11,301 and later)
X-36302-38-2 (Serial No. up to 11,300)
arm T ass'y, tension
3-630-595-00
spring, tension
X-36302-91-0
photo transistor ass'y
3-630-596-00
spring, tension
⊕PS 3x6
retaining ring, 3mm dia
⊕PS 3x6
X-36302-39-0
sub-lever ass'y, tension arm T
washer, fiber; 4mm dia
3-630-502-00
lever, brake release
retaining ring, 3mm dia
⊕PS 3x6
retaining ring, 3mm dia
3-630-620-00
spring, tension
retaining ring, 3mm dia
3-630-591-00
guide, skew rod
X-36302-43-0
lever ass'y, tension arm T release
⊕PS 3x6
X-36302-26-0
lever ass'y, brake
washer, 3mm dia (small)
3-630-619-00
spring, tension
3-630-505-02
lever B, tension arm cancel
(Serial No. 11,001 and later)
3-630-583-00
anchor, tension spring
retaining ring, 4mm dia
washer, fiber; 4mm dia
X-36302-25-0
brake plate ass'y
retaining ring, 3mm dia
I
⊕PS 3x6
3-630-505-01
lever B, tension arm cancel
(Serial No. up to 11,000)
⊕P 2.6x14
X-36322-05-2
bracket ass'y, microswitch
(Serial No. 11,001 and later)
X-36302-33-0
subchassis ass'y
3-632-271-02 (Serial No. 11,001 and later)
3-632-271-01 (Serial No. up to 11,000)
actuator C, microswitch
1-514-730-12
microswitch, S6016
X-36322-05-1
bracket ass'y, microswitch
(Serial No. up to 11,000)
retaining ring, 3mm dia

12-12. EXPLODED VIEW (K)


1-532-298-00
fuse, 2A
1-533-048-00
fuse post
X-36302-52-1
knob, ass'y, COLOR LOCK
⊕PS 3x6
⊕B 3x4
⊕B 3x4
supplied with variable resistor
⊕PS 3x6
⊕B 3x4
1-509-462-11
connector, VHF OUT
supplied with mini jack
(Serial No. 11,001 and later)
3-630-912-02
washer, mini jack
⊕K 3x8
⊕K 3x6
⊕K 3x6
3-632-524-00 (Serial No. 11,001 and later)
3-632-521-02 (Serial No. up to 11,000)
panel, rear
1-509-502-21
connector, VIDEO OUT
supplied with 3-p socket
⊕K 2.6x4
3-630-711-03 (Serial No. 11,001 and later)
3-630-701-00 (Serial No. up to 11,000)
subchassis, rear
1-108-779-11
0.01μF, MP capacitor
3-401-156-00
insulator, mini jack
1-507-251-00
jack, mini (AUDIO MONITOR)
(Serial No. 11,001 and later)
1-514-459-00
switch, slide
(MONITOR SELECTOR)
1-536-296-00
terminal strip, 1L2L1
1-421-302-13
filter, line
X-36303-83-0
W board, complete
washer, spring; 3mm dia
1-507-142-00
phono jack, 2-p
nut, 3mm dia
lug, 3mm dia
nut, 3mm dia
supplied with fuse post
supplied with VHF OUT connector
supplied with VIDEO OUT connector
1-222-695-00
resistor, variable 1k (B),
(with COLOR LOCK switch)
1-508-379-00
ac input connector, 3-p
1-509-332-00
socket, 3-p
washer, spring; 3mm dia
nut, 3mm dia

12-13. EXPLODED VIEW (L)


1-508-033-20
housing (white), amplok
1-536-080-11
pin contact, amplok
1-508-033-12
housing (red), amplok
1-536-080-11
pin contact, amplok
1-536-269-13
terminal, VHF/UHF ANTENNA
3-632-007-00
cover, shield; L board
⊕PS 3x6
1-520-109-00
meter, TUNING
3-632-008-00
cushion, TUNING meter
8-985-313-00
S board
washer, 3 mm dia
⊕PS 3x6
⊕B 3x6
8-985-311-00
L board
⊕PS 3x6
⊕PS 3x6
⊕PS 3x6
⊕P 3x8, self-tapping screw
3-632-003-00
subchassis, rear
3-632-006-00
shield, L board
1-518-082-21
lamp, TUNING meter
washer, 3 mm dia
3-442-022-01
grommet, TUNING
meter lamp
⊕PS 3x6
X-36322-83-1
connector ass'y, intermediary
1-509-502-21
input connector, COAXIAL
cable (VIDEO IN)
3-632-004-00
panel, rear; record
pack section
1-507-142-13
phono jack 2-P
8-985-308-00
H board
3-421-126-02
spacer, MIC IN jack
⊕K 3x6
⊕PS 3x6
washer, 3 mm dia (middle)
⊕P 3x8, self-tapping screw
⊕PS 3x6
⊕PS 3x6
washer, 3 mm
dia (middle)
⊕PS 3x6
washer, 3 mm dia (middle)
3-401-156-00
spacer, MIC IN jack
nut, 3 mm dia
⊕PS 3x6
1-507-251-00
jack, MIC IN
washer, fiber; 3 mm dia
⊕PS 3x6
⊕PS 3x6
⊕PS 3x6
washer, 3 mm dia (middle)
3-632-001-00
main chassis, record
3-632-002-00
bracket, VHF/UHF
tuner support
⊕PS 3x6
3-140-960-01
knob, INPUT SIGNAL
SELECTOR switch
washer, 3 mm dia
(middle)
1-463-016-11
VHF tuner ass'y
8-985-307-00
G board
▲1
1-514-963-11
switch, lever/slide (INPUT
SIGNAL SELECTOR)
1-463-068-31
UHF tuner ass'y
⊕PS 3x6
▲2
1-581-248-11
T board
washer, fiber; 3 mm dia
⊕PS 3x6
8-985-312-00
V board
3-632-013-00
(Serial No. 10,301 and later)
shield cover, G board

Note: ▲1～2 X-36303-84-1 (T board, complete) includes all the parts marked ▲.

SECTION 13
ELECTRICAL PARTS LIST

MOUNTED CIRCUIT BOARDS

Ref. No.	*Part No.*	*Description*
	8-985-301-01	A-R Board, complete
	8-985-302-01	B-R Board, complete
	8-985-303-01	C-R Board, complete (Se. No. up to 11,000)
	8-985-303-11	C-R Board, complete (Se. No. 11,001 and later)
	8-985-304-00	D Board, complete (Se. No. up to 10,400) Y Board, complete (Se. No. up to 10,400)
	8-985-304-10	D-1 Board, complete (Se. No. 10,401 and later)
	8-985-305-00	E Board, complete (Se. No. up to 19,100)
	8-985-415-00	E-P Board, complete (Se. No. 19,101 and later)
	8-985-306-00	F Board, complete
	8-985-307-00	G Board, complete
	8-985-308-00	H Board, complete
	8-985-309-00	K Board, complete
	8-985-310-00	J Board, complete
	8-985-311-00	L Board, complete
	8-985-312-00	V Board, complete
	8-985-313-00	S Board, complete
	X-36302-99-1	M Board, complete N Board, complete (Se. No. up to 11,000)
	X-36302-98-1	Nh Board, complete (Se. No. 11,001 and later)
	X-36302-82-0	VHF/AUDIO Switch Board (Se. No. up to 11,000)
	X-36302-97-1	Ph Board, complete (Se. No. 11,001 and later)
	X-36303-81-1	Q Board, complete
	X-36303-82-1	R Board, complete
	X-36303-83-1	W Board, complete
	X-36303-84-1	T Board, complete
	1-581-309-11	U Board, complete
	1-463-016-11	VHF Tuner Ass'y (BT-702WU)
	1-463-068-31	UHF Tuner Ass'y (BT-106)

SEMICONDUCTORS

Ref. No.	*Part No.*	*Description*	
D1001	8-719-314-41	diode	1S2144A
D1002	8-719-314-41	diode	1S2144A
D1003	8-719-314-41	diode	1S2144A
D1004	8-719-314-41	diode	1S2144A
D1005		diode	RD4A
D1006	8-719-815-87	diode	1S1587
D1007	8-719-815-87	diode	1S1587
D1008	8-719-815-87	diode	1S1587
D1009	8-719-815-87	diode	1S1587
D1010		diode	1S2144A
D1011		diode	1S2144A
D1012		diode	1S2144A
D1013		diode	1S2144A
D1401	8-719-815-55	diode	1S1555
D1402		diode	1S1555
D1403		diode	1S1555
D1501		diode	1S2144A
D1502		diode	1S2144A
D1503		diode	1S2144A
D1504		diode	1S2144A
D1505		diode	RD13A
D1506		diode	1S2144A
D1507		diode	1S2144A
D1508		diode	1S2144A
D1509		diode	1S2144A
D1510		diode	1S2144A
D1511		diode	1S2144A
D1512		diode	1S2144A
D1513		diode	1S2144A
D1514	8-719-815-87	diode	1S1587
D1515	8-719-815-87	diode	1S1587
D1516	8-719-815-87	diode	1S1587
D1517	8-719-815-87	diode	1S1587
D1518		diode	1S1587
D1519		diode	1S1587
D1527		diode	1S2144A
D1528		diode	1S2144A
D1529		diode	1S1555
D1530		diode	1S1555
D1531		diode	1S2144A
D1532		diode	1S2144A
D1533		diode	1S2144A
D1534		diode	1S2144A
D1535		diode	1S2144A
D1536		diode	1S1925
D1537		diode	1S1555
D1538		diode	RD6A
D1539		diode	RD6A
D2001 (D2101)	8-719-815-55	diode	1S1555
D2002 (D2102)	8-719-210-02	diode	10D-2
D2201	8-719-815-55	diode	1S1555
D2202	8-719-815-55	diode	1S1555
D2203	8-719-815-55	diode	1S1555
D3001		diode	1T22
D3002		diode	1S1555
D3003		diode	1S1555
D3004		diode	1S1555
D3005		diode	1S1555
D3006		diode	1S1555
D3007		diode	1S1555

Note: Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*		
D3008		diode	1S1555	
D3009		diode	1S1555	
D3010		diode	1S1555	
D3011		diode	1S1555	
D3012		diode	1T22	
D3013		diode	1S1555	
D3014		diode	1S1555	
D3015		diode	1S1555	
D3016		diode	1S1555	
D3017	8-719-815-55	diode	1S1555	
D4001		diode	1S1555	
D4002		diode	1S1555	
D4003		diode	1S1555	
D4004		diode	1S1555	
D4005		diode	1S1555	
D4006		---------------		
D4007		diode	10D-2	
D4008		diode	1S1555	
D4009		diode	1S1555	
D4010		diode	1S1555	
D4011		diode	1S1555	
D4012		diode	1S1555	
D4013		diode	10D-2	
D4014		diode	1S1555	
D4015		diode	10D-2	
C4016		diode	1S1555	
D4017		diode	RD7A	
D4018		diode	1S1555	
D4019		diode	1S1555	
D4020		diode	1S1555	
D4021		diode	1S1555	
D4022		diode	1S1555	
D4023		diode	1S1555	
D4024		diode	1S1555	
D4025		diode	1S1555	
D4026	8-719-815-55	diode	1S1555	(Se. No. 10,401 and later)
D4027	8-719-815-55	diode	1S1555	
D4028	8-719-815-55	diode	1S1555	
D4029	8-719-815-55	diode	1S1555	
D4030	8-719-815-55	diode	1S1555	
D4031	8-719-815-55	diode	1S1555	
D6001		diode	10D-2	
D6002		diode	10D-2	
D6003		diode	10D-2	
D6004	8-719-210-02	diode	10D-2	
D6101		diode	CD-2	
D6102		diode	CDR-2	
D6103		diode	RD-13A	
D6104		diode	1S331	
D6105		diode	SA-2	
D6106		diode	SA-2	

Ref. No.	*Part No.*	*Description*	
D6107		diode	SA-2
D6108		diode	SA-2
D6109		diode	1S331
D7001	8-719-815-87	diode	1S1587
D7002	8-719-815-87	diode	1S1587
D7003	8-719-815-87	diode	1S1587
D8201		diode	1T261
D8202		diode	1T40
D8203		diode	ZB1-11
D8204		diode	1T261
D8205		diode	1T40
IC1501		IC	CX-034
IC3001		IC	CX-506
IC3002		IC	CX-506
IC8201		IC	M-5142P
TH1001	8-690-006-00	thermistor	S-1250
TH8201		thermistor	
Q1001		transistor	2SC403B
Q1002		transistor	2SC403B
Q1003		transistor	2SB403B
Q1004		transistor	2SB403B
Q1005		transistor	2SB403B
Q1006		transistor	2SA678
Q1007		transistor	2SC403B
Q1008		transistor	2SC403B
Q1009		transistor	2SK23A
Q1010		transistor	2SC403B
Q1011		transistor	2SC403B
Q1012		transistor	2SC403B
Q1013		transistor	2SC403B
Q1014		transistor	2SC403B
Q1015		transistor	2SC403B
Q1016		transistor	2SC403B
Q1017		transistor	2SC403B
Q1018		transistor	2SC403B
Q1019		transistor	2SC403B
Q1020		transistor	2SC403B
Q1021		transistor	2SC403B
Q1022		transistor	2SC403B
Q1023		transistor	2SC403B
Q1024		transistor	2SC403B
Q1025		transistor	2SC403B
Q1026		transistor	2SC403B
Q1027		transistor	2SC403B
Q1028		transistor	2SC403B
Q1029		transistor	2SC403B
Q1030		transistor	2SA678
Q1031		transistor	2SK23A

Ref. No.	*Part No.*	*Description*	
Q1032		transistor	2SC403B
Q1033		transistor	2SA678
Q1034		transistor	2SA678
Q1035		transistor	2SC403B
Q1036		transistor	2SC403B
Q1037		transistor	2SC403B
Q1038		transistor	2SC403B
Q1039		transistor	2SC403B
Q1040		transistor	2SC403B
Q1041		transistor	2SC403B
Q1042		transistor	2SC403B
Q1043		transistor	2SC403B
Q1044		transistor	2SC403B
Q1045	8-724-355-00	transistor	2SC403B
Q1046	8-727-786-00	transistor	2SA678
Q1047	8-725-412-00	transistor	2SC1124
Q1048		transistor	2SC403B
Q1049		transistor	2SC403B
Q1050		transistor	2SC403B
Q1051	8-724-355-00	transistor	2SC403B
Q1052	8-727-786-00	transistor	2SA678
Q1053	8-725-412-00	transistor	2SC1124
Q1054	8-727-561-36	transistor	2SC756
Q1055		transistor	2SC403B
Q1401		transistor	2SK43
Q1402		transistor	2SC403B-5
Q1403		transistor	2SC403B-5
Q1404		transistor	2SC403B-5
Q1405		transistor	2SC634A-6
Q1406		transistor	2SC403B-5
Q1407		transistor	2SK43
Q1408		transistor	2SC403B-5
Q1409		transistor	2SC403B-5
Q1410		transistor	2SC403B-5
Q1411		transistor	2SC634A-6
Q1412		transistor	2SC403B-5
Q1413		transistor	2SC403B-5
Q1414		transistor	2SC403B-5
Q1415		transistor	2SC403B-5
Q1416		transistor	2SC403B-5
Q1417		transistor	2SC403B-5
Q1418		transistor	2SC634A-6
Q1419		transistor	2SC634A-6
Q1501		transistor	2SC403B
Q1502		transistor	2SC403B
Q1503		transistor	2SC403B
Q1504		transistor	2SC403B
Q1505		transistor	2SC403B
Q1506		transistor	2SC634A
Q1507		transistor	2SC634A
Q1508		transistor	2SC634A

Ref. No.	*Part No.*	*Description*	
Q1509		transistor	2SC403B
Q1510		transistor	2SC403B
Q1511	8-724-354-00	transistor	2SC403B
Q1512	8-724-354-00	transistor	2SC403B
Q1513		transistor	2SC403B
Q1514		transistor	2SK23A
Q1515		transistor	2SC403B
Q1516		transistor	2SC403B
Q1517		transistor	2SC403B
Q1518		transistor	2SC403B
Q1519		transistor	2SC403B
Q1520		transistor	2SC403B
Q1521		transistor	2SC403B
Q1522		transistor	2SC403B
Q1523		transistor	2SA678
Q1524		---------------	
Q1525		transistor	2SC403B
Q1526		transistor	2SC403B
Q1527		transistor	2SC403B
Q1528		transistor	2SA678
Q1529		transistor	2SC634A
Q1530		transistor	2SC634A
Q1531		transistor	2SC634A
Q1532	8-724-354-00	transistor	2SC403B
Q1533	8-724-354-00	transistor	2SC403B
Q1534		transistor	2SC403B
Q1535		transistor	2SC403B
Q1536		transistor	2SC403B
Q1537		transistor	2SC403B
Q1538		transistor	2SC403B
Q1539		transistor	2SC403B
Q1540		transistor	2SC403B
Q1541		transistor	2SC403B
Q1542		transistor	2SC403B
Q1543		transistor	2SC403B
Q1544		transistor	2SC403B
Q1545		transistor	2SC1124
Q1546		transistor	2SK43
Q1547		transistor	2SC403B
Q1548		transistor	2SC403B
Q1549		transistor	2SC403B
Q1550		transistor	2SC403B
Q2001 (Q2101)		transistor	2SC631A
Q2002 (Q2102)		transistor	2SC631A
Q2003 (Q2103)		transistor	2SC631A
Q2004 (Q2104)		transistor	2SC634A
Q2005 (Q2105)		transistor	2SC634A

Ref. No.	*Part No.*	*Description*
Q2006 (Q2106)		transistor 2SC634A
Q2007 (Q2107)		transistor 2SC634A
Q2008		transistor 2SC634A (Se. No. 11,001 and later)
Q2201 (Q2301)	8-726-357-10	transistor 2SC631A
Q2202 (Q2302)	8-726-387-30	transistor 2SC634A
Q2203 (Q2303)	8-726-357-10	transistor 2SC631A
Q2204 (Q2304)	8-726-357-10	transistor 2SC631A
Q2205 (Q2305)	8-726-387-00	transistor 2SC634A
Q2206 (Q2306)	8-726-387-00	transistor 2SC634A
Q2207 (Q2307)	8-726-387-00	transistor 2SC634A
Q2208 (Q2308)	8-726-387-00	transistor 2SC634A
Q2209	8-726-387-00	transistor 2SC634A
Q2210	8-726-387-00	transistor 2SC634A
Q2211	8-726-387-00	transistor 2SC634A
Q2401	8-720-215-60	transistor 2SD291 (Se. No. up to 19,100) transistor 2SC1124 (Se. No. 19,101 and later)
Q2402	8-726-387-00	transistor 2SC634A (Se. No. up to 19,100) transistor 2SC1124 (Se. No. 19,101 and later)
Q2403		transistor 2SC634A (Se. No. 19,101 and later)
Q3001		transistor 2SC634A
Q3002		transistor 2SC634A
Q3003		transistor 2SC634A
Q3004		transistor 2SC634A
Q3005		transistor 2SC634A
Q3006		transistor 2SC634A
Q3007		transistor 2SC634A
Q3008		transistor 2SC634A
Q3009		transistor 2SC634A
Q3010		transistor 2SC634A
Q3011		transistor 2SC634A
Q3012		transistor 2SD291
Q3013		transistor 2SC634A

Ref. No.	*Part No.*	*Description*
Q3014		transistor 2SC634A
Q3015	8-726-387-00	transistor 2SC634A
Q3016		transistor 2SC634A
Q3017		transistor 2SC634A
Q3018		transistor 2SC634A
Q3019		transistor 2SC634A
Q3020		transistor 2SC634A
Q3021		transistor 2SC634A
Q3022	8-726-387-00	transistor 2SC634A
Q3023	8-726-387-00	transistor 2SC634A
Q4001		transistor 2SC634A
Q4002		transistor 2SC634A
Q4003		transistor 2SC634A
Q4004		transistor 2SC634A
Q4005		transistor 2SC634A
Q4006		transistor 2SC634A
Q4007		transistor 2SC634A
Q4008		transistor 2SD291
Q4009		transistor 2SC634A
Q4010		transistor 2SC634A
Q4011		transistor 2SD291
Q4012		transistor 2SC634A
Q4013		transistor 2SC634A
Q4014		transistor 2SC634A
Q4015		transistor 2SC634A
Q4016		transistor 2SC634A
Q4017		transistor 2SC634A
Q4018		transistor 2SC634A
Q4019		transistor 2SC634A
Q4020		transistor 2SC634A
Q4021		transistor 2SC634A
Q4022		transistor 2SC634A
Q4023		transistor 2SC634A
Q4024		transistor 2SD291
Q4025		transistor 2SC634A
Q4026		transistor 2SC634A
Q4027		transistor 2SC634A
Q4028		transistor 2SC634A
Q4029		transistor 2SC634A
Q4030		transistor 2SC634A
Q4031		transistor 2SC634A
Q4032		transistor 2SC634A
Q4033		transistor 2SC634A (Se. No. 10,401 and later)
Q4034		transistor 2SC634A (Se. No. 10,401 and later)
Q6001 Q6002		transistor } 2SD316 or transistor } 2SD82
Q6003	8-720-040-71	transistor photo TX-407

Ref. No.	*Part No.*	*Description*
Q6101		transistor 2SC1124
Q6102		transistor 2SC633A
Q6103		transistor 2SC1124
Q6104		transistor 2SC633A
Q6105		transistor 2SC1124
Q6106		transistor 2SC633A
Q7001	8-725-800-00	transistor 2SC1128
Q7002	8-725-800-00	transistor 2SC1128
Q8201		transistor 2SC918
Q8202		transistor 2SC918
Q8203		transistor 2SC1128
Q8204		transistor 2SC633A
Q8205		transistor 2SA611 or 2SA564A
Q8206		transistor 2SA610 or 2SA564A
Q8207		transistor 2SC633A
Q8208		transistor 2SC633A
Q8209		transistor 2SC633A
Q8210		transistor 2SC633A
Th2401		thermistor S-1K (Se. No. 17,101 and later)

TRANSFORMERS, COILS AND INDUCTORS

Ref. No.	*Part No.*	*Description*
DL1001	1-415-051-12	delay coil (A)
DL1501	1-415-048-11	delay line
DL1502	1-415-049-11	delay line (B)
L1001	1-407-569-00	coil, variable 15 μH
L1002	1-407-202-00	inductor, micro 4.7 mH
L1003	1-407-161-00	inductor, micro 22 μH
L1004	1-407-569-00	coil, variable 10 μH
L1005	1-407-574-00	coil, variable 68 μH
L1006	1-407-160-00	inductor, micro 18 μH
L1007	1-407-166-00	inductor, micro 56 μH
L1008	1-411-095-00	coil, variable 56 μH
L1009	1-407-160-00	inductor, micro 18 μH
L1010	1-407-570-00	coil, variable 15 μH
L1011	1-407-172-00	inductor, micro 180 μH
L1012	1-407-172-00	inductor, micro 180 μH
L1013	1-407-161-00	inductor, micro 22 μH
L1014	1-407-579-00	coil, variable 1 mH
L1015	1-407-171-00	inductor, micro 150 μH
L1401	1-411-095-11	coil, variable 56 μH
L1402	1-411-095-11	coil, variable 56 μH
L1403	1-407-269-00	inductor, variable 2.2 mH
L1404	1-407-166-00	inductor, micro 56 μH
L1405	1-407-176-00	inductor, micro 390 μH
L1406	1-407-269-00	inductor, variable 2.2 mH
L1501	1-407-189-00	inductor, micro 8.2 μH
L1502	1-407-189-00	inductor, micro 8.2 μH
L1503	1-407-173-00	inductor, micro 220 μH
L1504	1-407-173-00	inductor, micro 220 μH
L1505	1-407-174-00	inductor, micro 270 μH
L1506	1-407-205-21	inductor, micro 8.2 mH
L1507		--------------
L1508		--------------
L1509	1-407-202-21	inductor, micro 4.7 mH
L1510	1-407-157-00	inductor, micro 10 μH
L1511	1-407-575-00	coil, variable 100 μH
L1512	1-407-583-00	coil, variable 270 μH
L1513	1-407-569-00	coil, variable 10 μH
L1514	1-407-569-00	coil, variable 10 μH
L1515	1-407-569-00	coil, variable 10 μH
L2001 (L2101)	1-407-259-00	inductor, variable 220 μH
L2002 (L2102)	1-407-240-00	inductor, variable 22 mH
L2201 (L2301)	1-407-090-12	coil, variable 1.5 mH
L2401	1-407-240-00	inductor, variable 22 mH
L2402	1-407-240-00	inductor, variable 22 mH
L6001	1-427-265-13	coil
L6002	1-421-303-13	coil, line filter
L6003	1-407-090-00	coil, dummy 1.5 mH
L7001	1-407-178-00	inductor, micro 1 μH
L7002	1-407-178-00	inductor, micro 1 μH
L7003	1-407-158-00	inductor, micro 12 μH
L8201	1-407-184-00	inductor, micro 3.3 μH
L8202	1-407-184-00	inductor, micro 3.3 μH
L8203	1-407-184-00	inductor, micro 3.3 μH
L8204	1-407-182-00	inductor, micro 2.2 μH
L8205	1-407-184-00	inductor, micro 3.3 μH
L8206	1-407-504-00	coil, detector
L8207	1-407-160-00	inductor, micro 18 μH
L8208	1-407-158-00	inductor, micro 12 μH
L8209	1-407-158-00	inductor, micro 12 μH
L8210	1-407-189-00	inductor, micro 8.2 μH
L8211	1-407-171-00	inductor, micro 150 μH
T1001	1-425-384-00	transformer, modulator
T1002	1-425-715-00	transformer, RF

Ref. No.	*Part No.*	*Description*
T1003	1-425-714-00	transformer, output
T1004	1-425-714-00	transformer, output
T1401	1-425-704-12	transformer, RF
T1402	1-425-704-12	transformer, RF
T1501	1-459-047-00	transformer, balance modulator
T1502	1-459-047-00	transformer, balance modulator
T1503	1-407-584-00	transformer, burst gate
T1504	1-425-544-00	transformer, differentiation
T2401	1-433-153-11 1-433-162-00	transformer, osc (Se. No. up to 19,100) transformer, osc (Se. No. 19,100 and later)
T2501	1-423-166-00 1-423-173-00	transformer, input (Se. No. up to 12,500) transformer, input (Se. No. 12,501 and later)
T6001	1-441-797-12	transformer, power
T6002 T6003	1-427-299-00	transformer, output (Se. No. 11,001 and later)
T7001	1-425-666-00	transformer, tuning
T8201	1-403-504-00	VIFT-1
T8202	1-403-548-00	47.25 MHz, wave trap, VIFT-T1
T8203	1-409-177-00	41.25 MHz, wave trap, VIFT-T2
T8204	1-403-549-00	39.75 MHz, wave trap, VIFT-T3
T8205	1-403-550-00	VIFT-2
T8206	1-403-550-00	VIFT-3
T8207	1-409-174-00	41.25 MHz, wave trap, VIFT-T4
T8208	1-403-524-00	VIFT-4
T8209	1-403-350-00	SIFT-1
T8210	1-403-371-00	SIFT-2
T8211	1-403-372-00	SIFT-3
T8212	1-409-146-00	4.5 MHz, wave trap

CAPACITORS

All capacitance values are in μF except as indicated with p, which means μμF.

Ref. No.	*Part No.*	*Description*
C1001	1-121-413-00	100 $\pm^{100}_{10}\%$ 6.3V electrolytic
C1002	1-121-415-00	100 $\pm^{100}_{10}\%$ 16V electrolytic
C1003	1-107-088-00	130p ±5% 50V silvered mica
C1004	1-121-421-00	220 $\pm^{100}_{10}\%$ 16V electrolytic
C1005	1-107-089-00	150p ±5% 50V silvered mica
C1006	1-121-409-00	47 $\pm^{100}_{10}\%$ 16V electrolytic
C1007	1-121-391-00	1 $\pm^{150}_{10}\%$ 50V electrolytic
C1008	1-105-661-12 1-105-664-12	0.001 ±10% 50V mylar (Se. No. up to 11,850) 0.0018 ±10% 50V mylar (Se. No. 11,851 and later)
C1009	1-105-673-12	0.01 ±10% 50V mylar
C1010	1-105-673-12	0.01 ±10% 50V mylar
C1011	1-121-395-00	4.7 $\pm^{100}_{10}\%$ 25V electrolytic
C1012	1-121-395-00	4.7 $\pm^{100}_{10}\%$ 25V electrolytic
C1013	1-121-410-00	47 $\pm^{100}_{10}\%$ 25V electrolytic
C1014	1-107-075-00	39p ±5% 50V silvered mica
C1015	1-121-395-00	4.7 $\pm^{100}_{10}\%$ 25V electrolytic
C1016	1-121-398-00	10 $\pm^{100}_{10}\%$ 25V electrolytic
C1017	1-121-416-00	100 $\pm^{100}_{10}\%$ 25V electrolytic
C1018	1-121-403-00	33 $\pm^{100}_{10}\%$ 16V electrolytic
C1019	1-121-415-00	100 $\pm^{100}_{10}\%$ 16V electrolytic
C1020	1-121-395-00	4.7 $\pm^{100}_{10}\%$ 25V electrolytic
C1021	1-127-083-00	0.47 $\pm^{40}_{20}\%$ 25V solid, aluminum
C1022	1-121-409-00	47 $\pm^{100}_{10}\%$ 16V electrolytic
C1023	1-121-409-00	47 $\pm^{100}_{10}\%$ 16V electrolytic
C1024	1-121-410-00	47 $\pm^{100}_{10}\%$ 25V electrolytic
C1025	1-121-391-00	1 $\pm^{150}_{10}\%$ 50V electrolytic
C1026	1-107-085-00	100p ±5% 50V silvered mica
C1027	1-101-006-00	0.047 $\pm^{100}_{10}\%$ 50V ceramic
C1028	1-121-391-00	1 $\pm^{150}_{10}\%$ 50V electrolytic
C1029	1-121-421-00	220 $\pm^{100}_{10}\%$ 16V electrolytic
C1030	1-107-093-00	220p ±5% 50V silvered mica
C1031	1-107-073-00	33p ±5% 50V silvered mica
C1032	1-121-421-00	220 $\pm^{100}_{10}\%$ 16V electrolytic
C1033	1-121-413-00	100 $\pm^{100}_{10}\%$ 6.3V electrolytic
C1034	1-121-409-00	47 $\pm^{100}_{10}\%$ 16V electrolytic
C1035	1-121-398-00	10 $\pm^{100}_{10}\%$ 25V electrolytic
C1036	1-121-398-00	10 $\pm^{100}_{10}\%$ 25V electrolytic
C1037	1-121-409-00	47 $\pm^{100}_{10}\%$ 16V electrolytic
C1038	1-107-097-00	330p ±5% 50V silvered mica
C1039	1-121-415-00	100 $\pm^{100}_{10}\%$ 16V electrolytic
C1040	1-121-398-00	10 $\pm^{100}_{10}\%$ 25V electrolytic
C1041	1-121-398-00	10 $\pm^{100}_{10}\%$ 25V electrolytic
C1042	1-121-415-00	100 $\pm^{100}_{10}\%$ 16V electrolytic
C1043	1-101-006-00	0.047 $\pm^{100}_{0}\%$ 50V ceramic
C1044	1-101-006-00	0.047 $\pm^{100}_{0}\%$ 50V ceramic
C1045	1-121-403-00	33 $\pm^{100}_{10}\%$ 16V electrolytic
C1046	1-107-077-00	47p ±5% 50V silvered mica
C1047	1-107-077-00	47p ±5% 50V silvered mica
C1048	1-101-006-00	0.047 $\pm^{100}_{0}\%$ 50V ceramic
C1049	1-101-004-00	0.01 $\pm^{100}_{0}\%$ 50V ceramic
C1050	1-101-001-00	0.001 $\pm^{100}_{0}\%$ 50V ceramic
C1051	1-101-004-00	0.01 $\pm^{100}_{0}\%$ 50V ceramic
C1052	1-101-006-00	0.047 $\pm^{100}_{0}\%$ 50V ceramic
C1053	1-121-391-00	1 $\pm^{150}_{10}\%$ 50V electrolytic
C1054	1-121-413-00	100 $\pm^{100}_{10}\%$ 6.3V electrolytic
C1055	1-121-391-00	1 $\pm^{150}_{10}\%$ 50V electrolytic
C1056	1-101-006-00	0.047 $\pm^{100}_{0}\%$ 50V ceramic
C1057	1-121-415-00	100 $\pm^{100}_{10}\%$ 16V electrolytic
C1058	1-107-077-00	47p ±5% 50V silvered mica
C1059	1-107-083-00	82p ±5% 50V silvered mica

Note: Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*			
C1060	1-107-089-00	150p	±5%	50V	silvered mica
C1061	1-107-083-00	82p	±5%	50V	silvered mica
C1062	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1063	1-107-077-00	47p	±5%	50V	silvered mica
C1064	1-101-001-00	0.001	$\pm^{100}_{0}$%	50V	ceramic
C1065	1-101-001-00	0.001	$\pm^{100}_{0}$%	50V	ceramic
C1066	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1067	1-107-085-00	100p	±5%	50V	silvered mica
C1068	1-101-001-00	0.001	$\pm^{100}_{0}$%	50V	ceramic
C1069	1-121-395-00	4.7	$\pm^{100}_{10}$%	25V	electrolytic
C1070	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1071	1-121-403-00	33	$\pm^{100}_{10}$%	16V	electrolytic
C1072	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1073	1-107-089-00	150p	±5%	50V	silvered mica
C1074	1-101-044-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1075	1-107-081-00	68p	±5%	50V	silvered mica
C1076	1-105-673-12	0.01	±10%	50V	mylar
C1077	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C1078	1-121-395-00	4.7	$\pm^{100}_{10}$%	25V	electrolytic
C1079	1-121-391-00	1	$\pm^{150}_{10}$%	50V	electrolytic
C1080	1-121-410-00	47	$\pm^{100}_{10}$%	25V	electrolytic
C1081	1-101-001-00	0.001	$\pm^{100}_{0}$%	50V	ceramic
C1082	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1083	1-101-001-00	0.001	$\pm^{100}_{0}$%	50V	ceramic
C1084	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1085	1-107-083-00	82p	±5%	50V	silvered mica
C1086	1-107-092-00	200p	±5%	50V	silvered mica
C1087	1-107-083-00	82p	±5%	50V	silvered mica
C1088	1-121-391-00	1	$\pm^{150}_{10}$%	50V	electrolytic
C1089	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1090	1-107-097-00	330p	±5%	50V	silvered mica
C1091	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1092	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1093	1-107-088-00	130p	±5%	50V	silvered mica
C1094	1-107-088-00	130p	±5%	50V	silvered mica
C1095	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1096	1-101-004-00	0.01	$\pm^{100}_{10}$%	50V	ceramic
C1097	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1098	1-121-391-00	1	$\pm^{150}_{10}$%	50V	silvered mica
C1099	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1100	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1101		--------------			
C1102	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1103	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1104	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C1105	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1106		--------------			
C1107	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C1108	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1109	1-141-131-00	50p			trimmer
C1110	1-107-073-00	33p	±5%	50V	silvered mica
C1111	1-102-758-00	56p	±5%	50V	ceramic
C1112	1-107-089-00	150p	±5%	50V	silvered mica
C1113	1-102-736-00	150p	±5%	50V	ceramic
C1114	1-101-001-00	0.001	$\pm^{100}_{0}$%	50V	ceramic
C1115	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1116	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1117	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1118	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1119	1-121-391-00	1	$\pm^{150}_{10}$%	50V	electrolytic
C1120	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1121	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1122		--------------			
C1123	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1124	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1125	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C1126	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1127		--------------			
C1128	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C1129	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1130	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1131	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C1132	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1133	1-101-004-00	0.01	$\pm^{100}_{10}$%	50V	ceramic
C1134	1-107-097-00	330p	±5%	50V	silvered mica
C1135	1-107-097-00	330p	±5%	50V	silvered mica
C1136	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1137	1-107-087-00	120p	±5%	50V	silvered mica
C1138	1-107-125-00	56p	±10%	50V	silvered mica
C1139	1-107-125-00	56p	±10%	50V	silvered mica
C1140	1-107-100-00	3p	±10%	50V	silvered mica
C1141	1-107-100-00	3p	±10%	50V	silvered mica
C1142	1-107-061-00	10p	±5%	50V	silvered mica
C1143	1-107-061-00	10p	±5%	50V	silvered mica
C1401	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1402	1-121-410-00	47	$\pm^{100}_{10}$%	25V	electrolytic
C1403	1-141-130-00	18p			trimmer
C1404	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1405	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1406	1-127-203-00	0.33	±20%	16V	solid, aluminum
C1407	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1408	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1409	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1410	1-121-410-00	47	$\pm^{100}_{10}$%	25V	electrolytic
C1411	1-141-130-00	18p			trimmer
C1412	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1413	1-101-004-00	0.01	$\pm^{100}_{0}$%	50V	ceramic
C1414	1-127-203-00	0.33	±20%	16V	solid, aluminum
C1415	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic
C1416	1-101-006-00	0.047	$\pm^{100}_{0}$%	50V	ceramic

Ref. No.	Part No.	Description			
C1417	1-105-667-12	0.0033	±10%	50V	mylar
C1418	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1419	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1420	1-107-085-00	100p	±5%	50V	silvered mica
C1421	1-109-164-00	560p	±5%	300V	silvered mica
C1422	1-107-085-00	100p	±5%	50V	silvered mica
C1423	1-107-089-00	150p	±5%	50V	silvered mica
C1424	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1425	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1426	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1427	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1428	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1429	1-105-667-12	0.0033	±10%	50V	mylar
C1430	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1431	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1432	1-101-439-00	680p	±20%	50V	ceramic
C1433	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1434	1-102-106-00	100p	±10%	50V	ceramic
C1435	1-102-106-00	100p	±10%	50V	ceramic
C1436	1-101-439-00	680p	±20%	50V	ceramic
C1437	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1438	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1501	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1502	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1503	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1504	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1505	1-121-404-00	33	$\pm^{100}_{10}\%$	25V	electrolytic
C1506	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1507	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1508	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1509	1-109-162-00	470p	±5%	300V	silvered mica
C1510	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1511	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1512	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1513	1-107-077-00	47p	±5%	50V	silvered mica
C1514	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1515	1-121-410-00	47	$\pm^{100}_{10}\%$	25V	electrolytic
C1516	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1517	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1518	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1519	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1520	1-109-160-00	390p	±5%	300V	silvered mica
C1521	1-121-404-00	33	$\pm^{100}_{10}\%$	25V	electrolytic
C1522	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1523	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1524	1-121-403-00	33	$\pm^{100}_{10}\%$	16V	electrolytic
C1525	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1526	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1527	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1528	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1529	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic

Ref. No.	Part No.	Description			
C1530	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1531	1-107-085-00	100p	±5%	50V	silvered mica
C1532	1-107-092-00	200p	±5%	50V	silvered mica
C1533	1-107-085-00	100p	±5%	50V	silvered mica
C1534	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1535	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1536	1-107-097-00	330p	±5%	50V	silvered mica
C1537	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1538	1-105-681-12	0.047	±10%	50V	mylar
C1539	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1540	1-121-415-00	100	$\pm^{100}_{0}\%$	16V	electrolytic
C1541	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1542	1-107-077-00	47p	±5%	50V	silvered mica
C1543	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1544		---------------			
C1545		---------------			
C1546	1-107-089-00	150p	±5%	50V	silvered mica
C1547	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1548	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1549	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1550	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1551	1-102-877-00	33p	±5%	50V	ceramic
C1552	1-102-877-00	33p	±5%	50V	ceramic
C1553	1-141-131-00	50p			trimmer
C1554	1-107-089-00	150p	±5%	50V	silvered mica
C1555	1-102-736-00	150p	±5%	50V	ceramic
C1556	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1557	1-101-001-00	0.001	$\pm^{100}_{0}\%$	50V	ceramic
C1558	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1559	1-101-001-00	0.001	$\pm^{100}_{0}\%$	50V	ceramic
C1560	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1561	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1562	1-101-001-00	0.001	$\pm^{100}_{0}\%$	50V	ceramic
C1563	1-107-089-00	150p	±5%	50V	silvered mica
C1564	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1565	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1566	1-121-416-00	100	$\pm^{100}_{10}\%$	25V	electrolytic
C1567	1-107-073-00	33p	±5%	50V	silvered mica
C1568	1-107-073-00	33p	±5%	50V	silvered mica
C1569	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1570	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1571	1-101-004-00	0.01	$\pm^{100}_{0}\%$	50V	ceramic
C1572	1-107-085-00	100p	±5%	50V	silvered mica
C1573	1-105-677-12	0.022	±10%	50V	mylar
C1582	1-107-079-00	56p	±5%	50V	silvered mica
C1583	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1584	1-121-395-00	4.7	$\pm^{150}_{10}\%$	25V	electrolytic
C1585	1-105-661-12	0.001	±10%	50V	mylar
C1586	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1587	1-105-673-12	0.01	±10%	50V	mylar
C1588	1-105-673-12	0.01	±10%	50V	mylar

Ref. No.	*Part No.*	*Description*			
C1589	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1590	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1591	1-109-162-00	470p	±5%	300V	silvered mica
C1592	1-105-665-12	0.0022	±10%	50V	mylar
C1593	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1594	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1595	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1596	1-101-001-00	0.001	$\pm^{100}_{0}\%$	50V	ceramic
C1597	1-101-044-00	0.1	$\pm^{80}_{20}\%$	50V	ceramic
C1598	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1599	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1600	1-121-391-00	1	$\pm^{150}_{10}\%$	50V	electrolytic
C1601	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1602	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1603	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1604	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3V	electrolytic
C1605	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1606	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1607	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C1608	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3V	electrolytic
C1609	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1610	1-107-094-00	240p	±5%	50V	silvered mica
C1611	1-121-415-00	100	$\pm^{100}_{10}\%$	16V	electrolytic
C1612	1-121-414-00	100	$\pm^{100}_{10}\%$	10V	electrolytic
C1613	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1614	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1615	1-121-414-00	100	$\pm^{100}_{10}\%$	10V	electrolytic
C1616	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3V	electrolytic
C1617	1-107-065-00	15p	±5%	50V	silvered mica
C1618	1-107-085-00	100p	±5%	50V	silvered mica
C1619	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1620	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1621	1-121-469-00	10	$\pm^{100}_{10}\%$	10V	electrolytic
C1622	1-121-415-00	100	$\pm^{100}_{10}\%$	16V	electrolytic
C1623	1-121-414-00	100	$\pm^{100}_{10}\%$	10V	electrolytic
C1624	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3V	electrolytic
C1625	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C1626	1-121-415-00	100	$\pm^{100}_{10}\%$	16V	electrolytic
C1627	1-121-403-00	33	$\pm^{100}_{10}\%$	16V	electrolytic
C1628	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3V	electrolytic
C1629	1-121-420-00	220	$\pm^{150}_{10}\%$	10V	electrolytic
C1630	1-121-410-00	47	$\pm^{100}_{10}\%$	25V	electrolytic
C1631	1-102-531-00	150p	±5%	50V	ceramic
C1632	1-102-531-00	150p	±5%	50V	ceramic
C1633	1-102-657-00	150p	±5%	50V	ceramic
C1634	1-102-656-00	120p	±5%	50V	ceramic
C1635	1-109-170-00	0.001	±5%	300V	silvered mica
C1636	1-109-170-00	0.001	±5%	300V	silvered mica
C1637	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1638	1-107-097-00	330p	±5%	50V	silvered mica
C1639	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1640	1-107-093-00	220p	±5%	50V	silvered mica

Ref. No.	*Part No.*	*Description*			
C1641	1-107-232-00	390p	±5%	50V	silvered mica
C1642	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1643	1-107-087-00	120p	±5%	50V	silvered mica
C1644	1-107-102-00	5p	±5%	50V	silvered mica
C1645	1-107-093-00	220p	±5%	50V	silvered mica
C1646	1-107-093-00	220p	±5%	50V	silvered mica
C1647	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
C1648	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
		(Se. No. 10,251 and later)			
C1650	1-107-077-00	47p	±5%	50V	silvered mica
C1651	1-107-079-00	56p	±5%	50V	silvered mica
		(Se. No. 10,345 and later)			
C1652	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50V	ceramic
*C1653	1-107-081-00 1-107-085-00 1-107-089-00	68p 100p 150p	±5% ±5% ±5%	50V 50V 50V	silvered mica silvered mica silvered mica
C2001 (C2101)	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C2002 (C2102)	1-102-106-00	100p	±10%	50V	ceramic
C2003 (C2103)	1-102-074-00	0.001	±10%	50V	ceramic
C2004 (C2104)	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3V	electrolytic
C2005 (C2105)	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C2006 (C2106)	1-102-112-00	330p	±10%	50V	ceramic
C2007 (C2107)	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C2008 (C2108)	1-105-679-12	0.033	±10%	50V	mylar
C2009 (C2109)	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C2010 (C2110)	1-127-093-00	0.47	±20%	25V	solid, aluminum
C2011 (C2111)	1-127-093-00	0.47	±20%	25V	solid, aluminum
C2012 (C2112)	1-121-416-00	100	$\pm^{100}_{10}\%$	25V	electrolytic
C2013 (C2113)	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C2014 (C2114)	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C2015 (C2115)	1-121-398-00	10	$\pm^{100}_{10}\%$	25V	electrolytic
C2017 (C2117)	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic
C2018 (C2118)	1-102-110-00	220p	±10%	50V	ceramic
C2019 (C2119)	1-121-409-00	47	$\pm^{100}_{10}\%$	16V	electrolytic

Note: * should be selected
Se. No. means Serial Number

Ref. No.	Part No.	Description			
C2020 (C2120)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2021 (C2121)	1-121-422-00	220	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. up to 11,000)			
	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. 11,001 and later)			
C2022 (C2122)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2023 (C2123)	1-121-422-00	220	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. up to 11,000)			
	1-121-409-00	47	$\pm^{100}_{10}$%	16V	electrolytic
		(Se. No. 11,001 and later)			
C2024 (C2124)	1-102-110-00	220p	±10%	50V	ceramic
C2025 (C2125)	1-105-675-12	0.015	±10%	50V	mylar
C2026 (C2126)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2027 (C2127)	1-121-422-00	220	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. 11,001 and later)			
C2028 (C2128)	1-121-422-00	220	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. 11,001 and later)			
C2201 (C2301)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2202 (C2302)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2203 (C2303)	1-101-455-00	0.001	±20%	50V	ceramic
C2204 (C2304)	1-121-403-00	33	$\pm^{100}_{10}$%	16V	electrolytic
C2205 (C2305)	1-121-413-00	100	$\pm^{100}_{10}$%	6.3V	electrolytic
C2206 (C2306)	1-121-403-00	33	$\pm^{100}_{10}$%	16V	electrolytic
C2207 (C2307)	1-107-107-00	10p	±10%	50V	silvered mica
C2208 (C2308)	1-101-455-00	0.001	±20%	50V	ceramic
C2209 (C2309)	1-105-679-12	0.033	±10%	50V	mylar
C2210 (C2310	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2211 (C2311	1-121-409-00	47	$\pm^{100}_{10}$%	16V	electrolytic
C2212 (C2312)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2213 (C2313)	1-102-098-00	470p	±20%	50V	ceramic
C2214 (C2314)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2215 (C2315)	1-121-410-00	47	$\pm^{100}_{10}$%	25V	electrolytic
C2216 (C2316)	1-121-410-00	47	$\pm^{100}_{10}$%	25V	electrolytic
C2217 (C2317)	1-121-409-00	47	$\pm^{100}_{10}$%	16V	electrolytic
C2218 (C2318)	1-121-409-00	47	$\pm^{100}_{10}$%	16V	electrolytic
C2219 (C2319)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2220 (C2320)	1-105-687-12	0.15	±10%	50V	mylar
C2221 (C2321)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2222 (C2322)	1-105-679-12	0.033	±10%	50V	mylar
C2223 (C2323)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2224 (C2324)	1-121-422-00	220	$\pm^{100}_{10}$%	25V	electrolytic
C2225	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
(C2325)	1-102-098-00	470p	±20%	50V	ceramic
C2226 (C2326)	1-121-391-00	1	$\pm^{150}_{10}$%	50V	electrolytic
C2227 (C2327)	1-107-131-00	100p	±10%	50V	silvered mica
C2228	1-102-098-00	470p	±20%	50V	ceramic
(C2328)		--------------			
C2229		--------------			
(C2329)		--------------			
C2230		--------------			
(C2330)		--------------			
C2231	1-105-673-12	0.01	±10%	50V	mylar
(C2331)		--------------			
C2232	1-121-395-00	4.7	$\pm^{100}_{10}$%	25V	electrolytic
(C2332)		--------------			
C2233	1-121-964-00	47	±20%	25V	electrolytic
(C2333)		--------------			
C2234	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
(C2334)		--------------			
C2235		--------------			
(C2335)		--------------			
C2236		--------------			
(C2336)		--------------			
C2237 (C2337)	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
C2238	1-127-006-00	1	±20%	16V	solid aluminum
		(Se. No. 13,401 and later)			
C2401	1-121-410-00	47	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. up to 19,100)			
	1-121-398-00	10	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. 19,101 and later)			
C2402	1-105-837-12	0.022	±20%	50V	mylar
		(Se. No. up to 19,100)			
	1-121-416-00	100	$\pm^{100}_{10}$%	25V	electrolytic
		(Se. No. 19,101 and later)			

Ref. No.	*Part No.*	*Description*			
C2403	1-105-845-12	0.1	±20%	50 V	mylar
		(Se. No. up to 19,100)			
	1-129-763-00	0.033	±10%	200 V	polypropylene
		(Se. No. 19,101 and later)			
C2404	1-129-709-00	0.0039	±10%	630 V	polypropylene
		(Se. No. up to 19,100)			
	1-105-678-12	0.027	±10%	50 V	mylar
		(Se. No. 19,101 and later)			
C2405	1-141-010-00	30~200p			trimmer
C2406	1-141-010-00	30~200p			trimmer
C2407	1-107-097-00	330p	±5%	50 V	silvered mica
C2408	1-107-097-00	330p	±5%	50 V	silvered mica
※ C2409	1-107-177-00	220p	±5%	500 V	silvered mica
		(Se. No. up to 19,100)			
	1-107-185-00	470p	±5%	500 V	silvered mica
		(Se. No. up to 19,100)			
	1-107-188-00	620p	±5%	500 V	silvered mica
		(Se. No. up to 19,100)			
	1-129-705-00	0.0018	±10%	630 V	polypropylene
		(Se. No. 19,101 and later)			
C2410	1-121-398-00	10	$\pm^{100}_{10}\%$	25 V	electrolytic
		(Se. No. up to 19,100)			
C3001	1-121-469-00	10	$\pm^{100}_{10}\%$	10 V	electrolytic
C3002	1-105-673-12	0.01	±10%	50 V	mylar
C3003	1-107-079-00	56p	±5%	50 V	silvered mica
C3004	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3 V	electrolytic
C3005	1-121-391-00	1	$\pm^{150}_{10}\%$	50 V	electrolytic
C3006	1-121-402-00	33	$\pm^{100}_{10}\%$	10 V	electrolytic
C3007	1-105-685-12	0.1	±10%	50 V	mylar
C3008	1-105-673-12	0.01	±10%	50 V	mylar
C3009	1-101-005-00	0.022	$\pm^{100}_{0}\%$	50 V	ceramic
C3010	1-105-677-12	0.022	±10%	50 V	mylar
C3011	1-105-673-12	0.01	±10%	50 V	mylar
C3012	1-127-023-00	1	±20%	10 V	solid, aluminum
C3013	1-105-673-12	0.01	±10%	50 V	mylar
C3014	1-127-022-00	0.47	±20%	10 V	solid, aluminum
C3015	1-121-409-00	47	$\pm^{100}_{10}\%$	10 V	electrolytic
C3016	1-105-685-12	0.1	±10%	50 V	mylar
C3017	1-105-673-12	0.01	±10%	50 V	mylar
C3018	1-101-005-00	0.022	$\pm^{100}_{0}\%$	50 V	ceramic
C3019	1-105-677-12	0.022	±10%	50 V	mylar
C3020	1-105-673-12	0.01	±10%	50 V	mylar
C3021	1-127-022-00	0.47	±20%	10 V	solid, aluminum
C3023	1-127-022-00	0.47	±20%	10 V	solid, aluminum
C3024	1-121-420-00	220	$\pm^{100}_{10}\%$	10 V	electrolytic
C3025	1-121-469-00	10	$\pm^{100}_{10}\%$	10 V	electrolytic
C3026	1-127-021-00	0.33	±20%	10 V	solid, aluminum

※ should be selected.

Ref. No.	*Part No.*	*Description*			
C3027	1-121-413-00	100	$\pm^{100}_{10}\%$	6.3 V	electrolytic
C3028	1-105-685-12	0.1	±10%	50 V	mylar
C3029	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50 V	ceramic
C3030	1-105-673-12	0.01	±10%	50 V	mylar
C3031	1-121-409-00	47	$\pm^{100}_{10}\%$	16 V	electrolytic
C3032	1-121-391-00	1	$\pm^{150}_{10}\%$	50 V	electrolytic
C3033	1-121-416-00	100	$\pm^{100}_{10}\%$	25 V	electrolytic
C3034	1-105-661-12	0.001	±10%	50 V	mylar
C3035	1-105-661-12	0.001	±10%	50 V	mylar
C3036	1-105-681-12	0.047	±10%	50 V	mylar
C3039	1-121-395-00	4.7	$\pm^{150}_{10}\%$	25 V	electrolytic
C3040	1-121-395-00	4.7	$\pm^{150}_{10}\%$	25 V	electrolytic
C3041	1-105-673-12	0.01	±10%	50 V	mylar
C3042	1-105-683-12	0.068	±10%	50 V	mylar
C3043	1-121-469-00	10	$\pm^{100}_{10}\%$	10 V	electrolytic
C3044	1-101-006-00	0.047	$\pm^{100}_{0}\%$	50 V	ceramic
C3045	1-105-673-12	0.01	±10%	50 V	mylar
C3046	1-121-395-00	4.7	$\pm^{150}_{10}\%$	25 V	electrolytic
C3047	1-121-404-00	33	$\pm^{100}_{10}\%$	25 V	electrolytic
C3048	1-121-392-00	3.3	$\pm^{150}_{10}\%$	25 V	electrolytic
C3049	1-121-409-00	47	$\pm^{100}_{10}\%$	16 V	electrolytic
C3050	1-121-404-00	33	$\pm^{100}_{10}\%$	25 V	electrolytic
C4001	1-121-415-00	100	$\pm^{100}_{10}\%$	16 V	electrolytic
C4002	1-127-309-00	22	±20%	16 V	solid, aluminum
C4003		---------------			
C4004	1-121-398-00	10	$\pm^{100}_{10}\%$	25 V	electrolytic
C4005	1-105-673-12	0.01	±10%	50 V	mylar
C4006	1-101-001-00	1,000p	$\pm^{100}_{0}\%$	50 V	ceramic
C4007	1-127-021-00	0.33	±20%	10 V	solid, aluminum
C4008	1-121-402-00	33	$\pm^{100}_{10}\%$	10 V	electrolytic
C4009	1-127-257-00	10	±20%	6.3 V	solid, aluminum
C4010	1-127-257-00	10	±20%	6.3 V	solid, aluminum
C4011	1-127-309-00	22	±20%	16 V	solid, aluminum
C4012	1-127-203-00	0.33	±20%	16 V	solid, aluminum
C4013	1-121-402-00	33	$\pm^{100}_{10}\%$	10 V	electrolytic
C4014	1-105-673-12	0.01	±10%	50 V	mylar
C4015	1-127-309-00	22	±20%	16 V	solid, aluminum
C4016	1-101-001-00	1,000p	$\pm^{100}_{0}\%$	50 V	ceramic
C4017	1-101-001-00	1,000p	$\pm^{100}_{0}\%$	50 V	ceramic
C4018	1-127-309-00	22	±20%	16 V	solid, aluminum
C4019	1-121-398-00	10	$\pm^{100}_{10}\%$	25 V	electrolytic
C4020	1-121-392-00	3.3	$\pm^{150}_{10}\%$	25 V	electrolytic

Ref. No.	Part No.	Description
C4021	1-101-004-00	0.01 ±20% 50V ceramic
R4022	1-242-697-00	10k
R4023	1-242-715-00	56k
R4024	1-242-705-00	22k
R4025	1-242-715-00	56k
R4026	1-242-705-00	22k
R4027	1-242-719-00	82k
C6001	1-102-072-00	130p $\pm^{200}_{0}$% 500V spark gap
C6002	1-102-072-00	130p $\pm^{200}_{0}$% 500V spark gap
C6003	**1-108-779-00**	**0.01 ±20% 250V MP**
C6004	1-113-069-00	2.5+1.2 $\pm^{10}_{5}$% 250V MP
C6005	1-121-074-00	1,000 $\pm^{150}_{10}$% 50V electrolytic
C6006	1-121-985-00	4,000 $\pm^{100}_{10}$% 25V electrolytic
C6007	**1-105-849-12**	**0.22 ±20% 50V mylar**
		(Se. No. up to 11,240)
C6008	1-101-006-00	0.0047 $\pm^{100}_{0}$% 50V ceramic
		(Se. No. 11,241 and later)
C6101	1-121-405-00	33 $\pm^{100}_{10}$% 50V electrolytic
C6102	1-121-422-00	220 $\pm^{100}_{10}$% 25V electrolytic
C6103	1-121-403-00	33 $\pm^{100}_{10}$% 16V electrolytic
C6104	1-105-685-12	0.1 ±10% 50V mylar
C6105	1-121-395-00	4.7 $\pm^{150}_{10}$% 25V electrolytic
C6106	1-121-415-00	100 $\pm^{100}_{10}$% 16V electrolytic
C6107	1-101-001-00	0.001 $\pm^{100}_{0}$% 50V ceramic
C6108	1-101-006-00	0.047 $\pm^{100}_{0}$% 50V ceramic
C6109	**1-105-721-12**	**0.047 ±10% 100V mylar**
C6201	1-121-416-00	100 $\pm^{100}_{10}$% 25V electrolytic
C6202	1-121-398-00	10 $\pm^{100}_{10}$% 25V electrolytic
C6203	1-121-391-00	1 $\pm^{150}_{10}$% 50V electrolytic
C6204	1-102-072-00	130p $\pm^{200}_{0}$% 500V ceramic
C6205	1-102-072-00	130p $\pm^{200}_{0}$% 500V ceramic
C7001	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7002	1-107-061-00	10p ±5% 50V silvered mica
C7003	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7004	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7005	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7006	1-107-075-00	39p ±5% 50V silvered mica
C7007	1-107-075-00	39p ±5% 50V silvered mica
C7008	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7009	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7010	1-102-678-00	100p ±5% 50V ceramic
C7011	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7012	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C7013	1-121-402-00	33 $\pm^{100}_{10}$% 10V electrolytic
C7014	1-101-002-00	2,200p $\pm^{100}_{0}$% 50V ceramic
C7015	1-102-975-00	100p ±10% 50V ceramic
C7016	1-102-956-00	15p ±10% 50V ceramic
C8201	1-102-862-00	3p ±0.5pF 50V ceramic
C8202	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8203	1-101-574-00	2.5p ±0.2pF 50V ceramic
C8204	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8205	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8206	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8207	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8208	1-101-058-00	0.0047 ±20% 50V ceramic
C8209	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8210	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8211	1-105-574-00	2.5p ±0.2pF 50V ceramic
C8212	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8213	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8214	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8215	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8216	1-121-402-00	33 $\pm^{100}_{10}$% 10V electrolytic
C8217	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8218	1-121-402-00	33 $\pm^{100}_{10}$% 10V electrolytic
C8219	1-101-574-00	2.5p ±0.2pF 50V ceramic
C8220	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8221	1-101-872-00	33p ±5% 50V ceramic
C8222	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8223	1-102-662-00	7p ±5% 50V ceramic
C8224	1-102-857-00	6p ±5% 50V ceramic
C8225	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8226	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8227	1-121-402-00	33 $\pm^{100}_{10}$% 10V electrolytic
C8228	1-101-959-00	10p ±5% 10V ceramic
C8229	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8230	1-121-398-00	10 $\pm^{100}_{10}$% 25V electrolytic
C8231	1-101-955-00	5p ±0.5pF 50V ceramic
C8232	1-101-455-00	0.001 ±20% 50V ceramic
C8233	1-105-717-12	0.022 ±20% 100V mylar
C8234	1-121-726-00	0.47 $\pm^{150}_{10}$% 50V electrolytic
C8235	1-121-396-00	4.7 $\pm^{100}_{10}$% 50V electrolytic
C8236	1-121-403-00	33 $\pm^{100}_{10}$% 16V electrolytic
C8237	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic
C8238	1-121-415-00	100 $\pm^{100}_{10}$% 16V electrolytic
C8239	1-102-940-00	3p ±0.5pF 50V ceramic
C8240	1-102-940-00	3p ±0.5pF 50V ceramic
C8241	1-102-947-00	10p ±5% 50V ceramic
C8242	1-102-942-00	5p ±5% 50V ceramic
C8243	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C8244	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C8245	1-101-455-00	0.001 ±20% 50V ceramic
C8246	1-102-101-00	0.0033 ±20% 50V ceramic
C8247		---------------
C8248	1-101-004-00	0.01 $\pm^{100}_{0}$% 50V ceramic
C8249	1-121-442-00	1 $\pm^{100}_{10}$% 50V electrolytic
C8250	1-121-409-00	47 $\pm^{100}_{10}$% 16V electrolytic
C8251	1-121-409-00	47 $\pm^{100}_{10}$% 16V electrolytic
C8252	1-121-442-00	1 $\pm^{100}_{10}$% 50V electrolytic
C8253	1-101-002-00	0.0022 $\pm^{100}_{0}$% 50V ceramic

Note: ▨ should be selected.
Serial No. 10,401 and later

Ref. No.	*Part No.*	*Description*
C8254	1-121-402-00	33 $\pm^{100}_{10}\%$ 10V electrolytic
C8255	1-121-402-00	33 $\pm^{100}_{10}\%$ 10V electrolytic
C8256	1-105-725-12	0.1 ±10% 100V mylar
C8257		---------------
C8258	1-121-409-00	47 $\pm^{100}_{10}\%$ 16V electrolytic
C8501	1-121-391-00	1 $\pm^{150}_{10}\%$ 50V electrolytic
C8502	1-105-673-12	0.01 ±10% 50V mylar
CV8201	1-141-092-00	5p cylinder trimmer

RESISTORS

All resistance values are in Ω, ±5%, ¼W and carbon type, unless otherwise indicated.

Ref. No.	*Part No.*	*Description*
R1001	1-242-705-00	22 k
R1002	1-242-697-00	10 k
R1003	1-242-677-00	1.5 k
R1004	1-242-673-00	1 k
R1005	1-242-677-00	1.5 k
R1006	1-242-673-00	1 k
R1007	1-242-673-00	1 k
R1008	1-242-697-00	10 k
R1009	1-242-717-00	68 k
R1010	1-242-689-00	4.7 k
R1011	1-242-683-00	2.7 k
R1012	1-242-653-00	150
R1013	1-242-673-00	1 k
R1014	1-242-657-00	220
R1015	1-242-743-00	820 k
R1016	1-242-709-00	33 k
R1017	1-242-677-00	1.5 k
R1018	1-242-692-00	6.2 k
R1019	1-242-705-00	22 k
R1020	1-242-705-00	22 k
R1021	1-242-697-00	10 k
R1022	1-242-685-00	3.3 k
R1023	1-242-697-00	10 k
R1024	1-242-685-00	3.3 k
R1025	1-242-675-00	1.2 k
R1026	1-242-665-00	470
R1027	1-242-699-00	12 k
R1028	1-242-677-00	1.5 k
R1029	1-242-690-00	5.1 k
R1030	1-242-665-00	470
R1031	1-242-677-00	1.5 k
R1032	1-242-673-00	1 k
R1033	1-242-693-00	6.8 k
R1034	1-242-661-00	330
R1035	1-242-673-00	1 k
R1036	1-221-997-00	2.2 k-(B), adjustable
R1037	1-242-685-00	3.3 k
R1039	1-242-724-00	130 k
R1040	1-242-705-00	22 k
R1041	1-242-685-00	3.3 k
R1042	1-242-657-00	220
R1043	1-242-692-00	6.2 k
R1044	1-242-681-00	2.2 k
R1045	1-242-675-00	1.2 k
R1046	1-242-649-00	100
R1047	1-242-729-00	220 k
R1048	1-242-681-00	2.2 k
R1049	1-242-709-00	33 k
R1050	1-242-655-00	180
R1051	1-244-721-00	100 k
R1052	1-221-997-00	2.2 k-(B), adjustable
R1053	1-244-673-00	1 k
R1054	1-244-673-00	1 k
R1055	1-242-673-00	1 k
R1056	1-242-659-00	270
R1057	1-242-689-00	4.7 k
R1058	1-242-714-00	51 k
R1059	1-242-689-00	4.7 k
R1060	1-242-697-00	10 k
R1061	1-244-703-00	18 k
R1062	1-242-697-00	10 k
R1063	1-242-697-00	10 k
R1064	1-242-673-00	1 k
R1065	1-242-697-00	10 k
R1066	1-242-697-00	10 k
R1067	1-244-703-00	18 k
R1068	1-244-721-00	100 k
R1069	1-242-705-00	22 k
R1070	1-244-668-00	620
R1071	1-242-679-00	1.8 k
R1072	1-242-673-00	1 k
R1073	1-242-673-00	1 k
R1074	1-242-673-00	1 k
R1075	1-242-677-00	1.5 k
R1076	1-221-997-00	2.2 k-(B), adjustable
R1077	1-242-673-00	1 k
R1078	1-242-673-00	1 k
R1079	1-244-871-00	820 ±5% ½W carbon
R1080	1-242-665-00	470
R1081	1-242-661-00	330
R1082	1-242-697-00	10 k
R1083	1-221-997-00	2.2 k-(B), adjustable
R1084	1-242-681-00	2.2 k
R1085	1-242-681-00	2.2 k
R1086	1-242-661-00	330
R1087	1-242-677-00	1.5 k
R1088	1-242-681-00	2.2 k
R1089	1-221-606-00	100-(B), adjustable
R1090	1-222-805-00	470-(B), adjustable

Ref. No.	*Part No.*	*Description*
R1091	1-242-681-00	2.2 k
R1092	1-242-661-00	330
R1093	1-242-677-00	1.5 k
R1094	1-242-673-00	1 k
R1095	1-242-714-00	51 k
R1096	1-242-693-00	6.8 k
R1097	1-242-673-00	1 k
R1098	1-242-649-00	100
R1099	1-242-667-00	560
R1100	1-242-699-00	12 k
R1101	1-242-709-00	33 k
R1102	1-242-673-00	1 k
R1103	1-242-712-00	43 k
R1104	1-242-712-00	43 k
R1105	1-242-685-00	3.3 k
R1106	1-242-649-00	100
R1107	1-242-673-00	1 k
R1108	1-242-673-00	1 k
R1109	1-242-670-00	750
R1110	1-242-649-00	100
R1111	1-242-670-00	750
R1112	1-242-693-00	6.8 k
R1113	1-242-715-00	56 k
R1114	1-242-681-00	2.2 k
R1115	1-242-701-00	15 k
R1116	1-242-689-00	4.7 k
R1117	1-242-673-00	1 k
R1118	1-242-668-00	620
R1119	1-242-677-00	1.5 k
R1120	1-242-687-00	3.9 k
R1121	1-242-653-00	150
R1122	1-244-688-00	4.3 k
R1123	1-244-861-00	330 ±5% ½W carbon
R1124	1-242-673-00	1 k
R1125	1-242-699-00	12 k
R1126	1-242-699-00	12 k
R1127	1-242-646-00	75
R1128	1-242-667-00	560
R1129	1-244-701-00 1-244-677-00	15 k (Se. No. up to 13,000) 1.5 k (Se. No. 13,001 and later)
R1130	1-244-661-00	330
R1131	1-242-661-00	330
R1132	1-242-705-00 1-242-737-00	22 k (Se. No. up to 13,000) 470 k (Se. No. 13,001 and later)
R1133	1-242-673-00	1 k
R1134	1-242-665-00	470
R1135	1-221-978-00	4.7 k-(B), adjustable
R1136	1-242-745-00	1 M
R1137	1-242-705-00	22 k
R1138	1-242-695-00	8.2 k
R1139	1-242-705-00	22 k
R1140	1-242-689-00	4.7 k
R1141	1-242-673-00	1 k
R1142	1-242-689-00	4.7 k
R1143	1-221-978-00	4.7 k-(B), adjustable
R1144	1-242-690-00	5.1 k
R1145	1-242-695-00	8.2 k
R1146	1-242-689-00	4.7 k
R1147	1-242-721-00	100 k
R1148	1-242-689-00	4.7 k
R1149	1-242-689-00	4.7 k
R1150	1-242-705-00	22 k
R1151	1-242-689-00	4.7 k
R1152	1-242-689-00	4.7 k
R1153	1-242-681-00	2.2 k
R1154	1-242-681-00	2.2 k
R1155	1-242-661-00	330
R1156	1-242-661-00	330
R1157	1-242-665-00	470
R1158	1-242-670-00	750
R1159	1-242-659-00	270
R1160	1-242-661-00	330
R1161	1-221-997-00	2.2 k-(B), adjustable
R1162	1-221-997-00	2.2 k-(B), adjustable
R1163	1-242-713-00	47 k
R1164	1-242-717-00	68 k
R1165	1-242-697-00	10 k
R1166	1-242-673-00	1 k
R1167	1-242-649-00	100
R1168	1-242-673-00	1 k
R1169	1-242-693-00	6.8 k
R1170	1-242-697-00	10 k
R1171	1-242-697-00	10 k
R1172	1-242-697-00	10 k
R1173	1-242-666-00	510
R1174	1-242-666-00	510
R1175	1-242-697-00	10 k
R1176	1-242-666-00	510
R1177	1-242-697-00	10 k
R1178	1-242-697-00	10 k
R1179	1-242-703-00	18 k
R1180	1-242-673-00	1 k
R1181	1-242-721-00	100 k
R1182	1-242-697-00	10 k
R1183	1-242-697-00	10 k
R1184	1-222-804-00	1 k-(B), adjustable
R1185	1-242-673-00	1 k
R1186	1-222-804-00	1 k-(B), adjustable
R1187	1-242-709-00	33 k
R1188	1-242-689-00	4.7 k
R1189	1-242-673-00	1 k
R1190	1-242-661-00	330
R1191	1-242-661-00	330
R1192	1-242-679-00	1.8 k

Note: Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*
R1193	1-242-665-00	470
R1194	1-242-699-00	12 k
R1195	1-221-606-00	100-(B), adjustable
R1196	1-242-689-00	4.7 k
R1197	1-221-986-00	330-(B), adjustable
R1198	1-242-659-00	270
R1199	1-242-647-00	82
R1200	1-242-633-00	22
R1201	1-244-855-00	180 ±5% ½W carbon
R1202	1-242-665-00	470
R1203		---------------
R1204	1-242-701-00	15 k
R1205	1-242-705-00	22 k
R1206	1-242-657-00	220
R1207	1-242-673-00	1 k
R1208	1-242-688-00	4.3 k
R1209	1-242-713-00	47 k
R1210	1-242-705-00	22 k
R1211	1-242-696-00	9.1 k
R1212	1-242-709-00	33 k
R1213	1-242-697-00	10 k
R1214	1-242-673-00	1 k
R1215	1-242-673-00	1 k
R1216	1-242-709-00	33 k
R1217	1-242-689-00	4.7 k
R1218	1-242-673-00	1 k
R1219	1-242-661-00	330
R1220	1-242-661-00	330
R1221	1-242-665-00	470
R1222	1-242-679-00	1.8 k
R1223	1-121-606-00	100-(B), adjustable
R1224	1-242-699-00	12 k
R1225	1-242-689-00	4.7 k
R1226	1-221-986-00	330-(B), adjustable
R1227	1-242-659-00	270
R1228	1-242-633-00	22
R1229	1-242-647-00	82
R1230	1-244-855-00	180 ±5% ½W carbon
R1231	1-242-665-00	470
R1232		---------------
R1233	1-242-641-00	47
R1234	1-242-649-00	100
R1235	1-242-709-00	33 k
R1236	1-242-689-00	4.7 k
R1237	1-242-697-00	10 k
R1238	1-242-705-00	22 k
R1239	1-242-666-00	510
R1240	1-244-709-00	33 k
R1401	1-221-979-00	22 k-(B), adjustable
R1402	1-242-649-00	100
R1403	1-242-685-00	3.3 k
R1404	1-242-689-00	4.7 k
R1405	1-242-703-00	18 k
R1406	1-242-680-00	2 k
R1407	1-242-691-00	5.6 k
R1408	1-242-714-00	51 k
R1409	1-242-649-00	100
R1410	1-242-673-00	1 k
R1411	1-221-978-00	4.7 k-(B), adjustable
R1412	1-242-673-00	1 k
R1413	1-242-691-00	5.6
R1414	1-242-680-00	2 k
R1415	1-242-680-00	2 k
R1416	1-221-979-00	22 k-(B), adjustable
R1417	1-242-649-00	100
R1418	1-242-685-00	3.3 k
R1419	1-242-689-00	4.7 k
R1420	1-242-703-00	18 k
R1421	1-242-680-00	2 k
R1422	1-242-691-00	5.6 k
R1423	1-242-714-00	51 k
R1424	1-242-649-00	100
R1425	1-242-673-00	1 k
R1426	1-221-978-00	4.7 k-(B), adjustable
R1427	1-242-673-00	1 k
R1428	1-242-691-00	5.6 k
R1429	1-242-680-00	2 k
R1430	1-242-680-00	2 k
R1431	1-221-997-00	2.2 k-(B), adjustable
R1432	1-242-721-00	100 k
R1433	1-242-673-00	1 k
R1434	1-242-666-00	510
R1435	1-242-673-00	1 k
R1436	1-242-697-00	10 k
R1437	1-242-680-00	2 k
R1438	1-242-691-00	5.6 k
R1439	1-242-673-00	1 k
R1440	1-242-680-00	2 k
R1441	1-242-697-00	10 k
R1442	1-242-680-00	2 k
R1443	1-242-691-00	5.6 k
R1444	1-242-721-00	100 k
R1445	1-222-993-00	220-(B), adjustable
R1446	1-221-997-00	2.2 k-(B), adjustable
R1447	1-242-721-00	100 k
R1448	1-242-673-00	1 k
R1449	1-244-673-00	1 k
R1450	1-242-709-00	33 k
R1451	1-242-685-00	3.3 k
R1452	1-242-713-00	47 k
R1453	1-242-683-00	2.7 k
R1454	1-242-713-00	47 k
R1455	1-242-685-00	3.3 k
R1456	1-242-709-00	33 k
R1501	1-242-721-00	100 k

Ref. No.	*Part No.*	*Description*
R1502	1-242-697-00	10 k
R1503	1-242-673-00	1 k
R1504	1-242-649-00	100
R1505	1-242-721-00	100 k
R1506	1-242-697-00	10 k
R1507	1-242-673-00	1 k
R1508	1-242-649-00	100
R1509	1-242-703-00	18 k
R1510	1-242-697-00	10 k
R1511	1-242-661-00	330
R1512	1-242-673-00	1 k
R1513	1-242-727-00	180 k
R1514	1-242-697-00	10 k
R1515	1-242-677-00	1.5 k
R1516	1-242-649-00	100
R1517	1-244-865-00	470 ±5% ½W carbon
R1518		---------------
R1519	1-242-688-00	4.3 k
R1520	1-221-693-00	1 k-(B), adjustable
R1521	1-242-673-00	1 k
R1522	1-242-663-00	390
R1523	1-242-695-00	8.2 k
R1524	1-242-689-00	4.7 k
R1525	1-242-669-00	680
R1526	1-242-665-00	470
R1527	1-242-685-00	3.3 k
R1528	1-242-729-00	220 k
R1529	1-242-697-00	10 k
R1530	1-242-665-00	470
R1531	1-242-665-00	470
R1532	1-242-653-00	150
R1533	1-242-653-00	150
R1534	1-242-661-00	330
R1535	1-242-723-00	120 k
R1536	1-242-697-00	10 k
R1537	1-242-673-00	1 k
R1538	1-242-637-00	33
R1539	1-242-673-00	1 k
R1540	1-242-665-00	470
R1541	1-242-665-00	470
R1542	1-221-663-00	2 k-(B), adjustable
R1543	1-242-673-00	1 k
R1544	1-242-705-00	22 k
R1545	1-242-697-00	10 k
R1546	1-242-673-00	1 k
R1547	1-242-697-00	10 k
R1548	1-242-697-00	10 k
R1549	1-242-695-00	8.2 k
R1550	1-242-697-00	10 k
R1551	1-242-697-00	10 k
R1552	1-242-697-00	10 k
R1553	1-242-695-00	8.2 k
R1554	1-242-673-00	1 k
R1555	1-222-804-00	1 k-(B), adjustable
R1556	1-242-725-00	150 k
R1557	1-242-697-00	10 k
R1558	1-242-681-00	2.2 k
R1559	1-242-681-00	2.2 k
R1560	1-242-651-00	120
R1561	1-242-685-00	3.3 k
R1562	1-244-737-00	470 k
R1563	1-242-729-00	220 k
R1564	1-242-661-00	330
R1565	1-242-701-00	15 k
R1566	1-222-701-00	10 k-(B), adjustable
R1567	1-242-673-00	1 k
R1568	1-242-719-00	82 k
R1569	1-242-697-00	10 k
R1570	1-242-681-00	2.2 k
R1571	1-242-649-00	100
R1572	1-242-673-00	1 k
R1573	1-242-681-00	2.2 k
R1574	1-242-705-00	22 k
R1575	1-242-697-00	10 k
R1576	1-242-653-00	150
R1577	1-242-677-00	1.5 k
R1578	1-242-645-00	68
R1579	1-242-666-00	510
R1580	2-42-670-00	750
R1581	1-222-804-00	1 k-(B), adjustable
R1582	1-242-705-00	22 k
R1583	1-242-697-00	10 k
R1584	1-242-673-00	1 k
R1585	1-242-683-00	2.7 k
R1586	1-242-705-00	22 k
R1587	1-242-701-00	15 k
R1588	1-242-657-00	220
R1589	1-242-673-00	1 k
R1590	1-242-691-00	5.6 k
R1591	1-242-701-00	15 k
R1592	1-242-705-00	22 k
R1593	1-242-673-00	1 k
R1594	1-242-677-00	1.5 k
R1595	1-242-725-00	150 k
R1596	1-242-689-00	4.7 k
R1597	1-242-673-00	1 k
R1598	1-242-653-00	150
R1599	1-242-673-00	1 k
R1600	1-242-673-00	1 k
R1601	1-242-721-00	100 k
R1602	1-242-697-00	10 k
R1603	1-242-681-00	2.2 k
R1604	1-242-653-00	150
R1605	1-242-705-00	22 k
R1606	1-242-705-00	22 k
R1607	1-242-673-00	1 k

Ref. No.	*Part No.*	*Description*
R1608	1-242-661-00	330
R1609	1-242-697-00	10 k
R1610	1-242-723-00	120 k
R1611	1-242-723-00	120 k
R1612	1-221-978-00	4.7 k-(B), adjustable
R1613	1-242-689-00	4.7 k
R1614	1-242-713-00	47 k
R1615	1-242-714-00	51 k
R1631	1-244-705-00	22 k
R1632	1-242-719-00	82 k
R1633	1-242-697-00	10 k
R1634	1-242-685-00	3.3 k
R1635	1-242-661-00	330
R1636	1-242-673-00	1 k
R1637	1-242-657-00	220
R1638	1-242-733-00	330 k
R1639	1-242-697-00	10 k
R1640	1-242-687-00	3.9 k
R1641	1-242-665-00	470
R1642	1-242-673-00	1 k
R1643	1-242-697-00	10 k
R1644	1-242-697-00	10 k
R1645	1-242-709-00	33 k
R1646	1-242-701-00	15 k
R1647	1-221-978-00	4.7 k-(B), adjustable
R1648	1-242-685-00	3.3 k
R1649	1-244-673-00	1 k
R1650	1-244-709-00	33 k
R1651	1-242-709-00	33 k
R1652	1-242-705-00	22 k
R1653	1-242-709-00	33 k
R1654	1-242-681-00	2.2 k
R1655	1-242-709-00	33 k
R1656	1-242-681-00	2.2 k
R1657	1-242-695-00	8.2 k
R1658	1-242-697-00	10 k
R1659	1-242-697-00	10 k
R1660	1-242-697-00	10 k
R1661	1-242-697-00	10 k
R1662	1-242-697-00	10 k
R1663	1-242-695-00	8.2 k
R1664	1-242-672-00	910
R1665	1-242-667-00	560
R1666	1-244-865-00	470 ±5% ½W carbon
R1667	1-221-606-00	100-(B), adjustable
R1668	1-242-672-00	910
R1669	1-242-667-00	560
R1670	1-242-703-00	18 k
R1671	1-242-697-00	10 k
R1672	1-242-677-00	15. k
R1673	1-242-649-00	100
R1674	1-242-705-00	22 k
R1675	1-242-673-00	1 k

Ref. No.	*Part No.*	*Description*
R1676	1-242-683-00	2.7 k
R1677	1-242-666-00	510
R1678	1-221-986-00	330-(B), adjustable
R1679	1-242-641-00	47
R1680	1-242-641-00	47
R1681	1-222-805-00	470-(B), adjustable
R1682	1-242-721-00	100 k
R1683	1-242-697-00	10 k
R1684	1-242-666-00	510
R1685	1-242-677-00	1.5 k
R1686	1-242-649-00	100
R1687	1-242-670-00	750
R1688	1-242-675-00	1.2 k
R1689	1-242-673-00	1 k
R1690	1-242-695-00	8.2 k
R1691	1-242-697-00	10 k
R1692	1-242-697-00	10 k
R1693	1-242-697-00	10 k
R1694	1-242-697-00	10 k
R1695	1-242-697-00	10 k
R1696	1-242-695-00	8.2 k
R1697	1-242-673-00	1 k
R1698	1-242-697-00	10 k
R1699	1-242-667-00	560
R1700	1-242-665-00	470
R1701	1-242-661-00	330
R1702	1-242-719-00	82 k
R1703	1-242-667-00	560
R1704	1-242-685-00	3.3 k
R1705	1-242-695-00	8.2 k
R1706	1-244-661-00	330
R1707	1-242-681-00	2.2 k
R1708	1-222-804-00	1 k-(B), adjustable
R1709	1-242-673-00	1 k
R1710	1-242-697-00	10 k
R1711	1-242-667-00	560
R1712	1-242-709-00	33 k
R1713	1-242-705-00	22 k
R1714	1-242-673-00	1 k
R1715	1-242-701-00	15 k
R1716	1-242-691-00	5.6 k
R1717	1-242-661-00	330
R1718	1-244-865-00	470 ±5% ½W carbon
R1719	1-242-646-00	75
R1720		--------------
R1721	1-242-661-00	330
R1722	1-242-661-00	330
※ R1723	1-242-699-00	12 k
	1-242-701-00	15 k
	1-242-703-00	18 k
R1724		--------------
R1725		--------------
R1726	1-222-783-00	47 k-(B), adjustable

Note: ※ should be selected.
Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*
R1727	1-242-679-00	1.8 k
R1728	1-242-697-00	10 k
R1729	1-242-681-00	2.2 k
R1730	1-242-681-00	2.2 k
R1731	1-242-705-00	22 k
R1732	1-242-697-00	10 k
R1733	1-242-645-00	68
R1734	1-242-677-00	1.5 k
R1735	1-242-675-00	1.2 k
R1736	1-242-683-00	2.7 k
R1737	1-242-685-00	3.3 k
R1738	1-242-671-00	820
R1739	1-242-661-00	330
R1740	1-242-731-00	270 k
R1741	1-242-701-00	15 k
R1742	1-242-705-00	22 k
R1743	1-242-707-00	27 k
R1744	1-242-717-00	68 k
R1745	1-242-695-00	8.2 k
R1746	1-242-689-00	4.7 k
R1747	1-242-713-00	47 k
R1748	1-242-663-00	390
R1749	1-242-682-00	2.4 k
R1750	1-244-875-00	1.2 k ±5% ½W carbon
R1751	1-242-677-00	1.5 k
R1752	1-222-804-00	1 k-(B), adjustable
R1753	1-242-677-00	1.5 k
R1754	1-242-697-00	10 k
R1756	1-244-653-00	150
R1757	1-242-669-00	680 (Se. No. 10,345 and later)
R1758	1-242-661-00	330
R2001 (R2101)	1-242-719-09	82 k, low-noise
R2002 (R2102)	1-242-697-09	10 k, low-noise
R2003 (R2103)	1-242-713-09	47 k, low-noise
R2004 (R2104)	1-242-725-09	150 k, low-noise
R2005 (R2105)	1-242-669-00	680
R2006 (R2106)	1-242-685-00	3.3 k
R2007 (R2107)	1-242-661-00	330
R2008 (R2108)	1-242-713-00	47 k
R2009 (R2109)	1-242-717-00	68 k
R2010 (R2110)	1-242-705-00	22 k

Ref. No.	*Part No.*	*Description*
R2011 (R2111)	1-242-693-00	6.8 k
R2012 (R2112)	1-221-978-00 1-221-844-00	4.7 k-(B), adjustable (Se. No. up to 11,000) 6.8 k-(B), adjustable (Se. No. 11,001 and later)
R2013 (R2113)	1-242-729-00	220 k
R2014 (R2114)	1-242-705-00	22 k
R2015 (R2115)	1-242-723-00	120 k
R2016 (R2116)	1-242-711-00	39 k
R2017 (R2117)	1-242-683-00	2.7 k
R2018 (R2118)	1-242-691-00	5.6 k
R2019 (R2119)	1-222-701-00	10 k-(B), adjustable
R2020 (R2120)	1-242-697-00	10 k
R2022 (R2122)	1-242-733-00	330 k
R2023 (R2123)	1-242-705-00	22 k
R2024 (R2124)	1-242-716-00	62 k
R2025 (R2125)	1-242-677-00	1.5 k
R2026 (R2126)	1-242-665-00	470
R2027 (R2127)	1-242-713-00	47 k
R2028 (R2128)	1-242-681-00	2.2 k
R2029 (R2129)	1-242-659-00	270
R2030 (R2130)	1-242-681-00	2.2 k
R2031 (R2131)	1-242-709-00	33 k Se. No. 11,001 and later
R2032 (R2132)	1-242-707-00 1-242-679-00	27 k (Se. No. up to 11,000) 1.8 k (Se. No. 11,001 and later)
R2033 (R2133)	1-242-709-00	33 k (Se. No. up to 11,000)
R2034 (R2134)	1-242-693-00 1-242-717-00	6.8 k (Se. No. up to 11,000) 68 k (Se. No. 11,001 and later)
R2035 (R2135)	1-242-653-00 1-242-721-00	150 (Se. No. up to 11,000) 100 k (Se. No. 11,001 and later)
R2036 (R2136)	1-242-649-00 1-242-700-00	100 (Se. No. up to 11,000) 13 k (Se. No. 11,001 and later)

Ref. No.	*Part No.*	*Description*
R2037	1-242-681-00	2.2 k (Se. No. 11,001 and later)
R2038	1-242-653-00	150
R2039	1-242-655-00	180
R2040 (R2140)	1-242-653-00	150
R2041		
R2042 (R2142)	1-242-649-00	100
R2201 (R2301)	1-244-713-09	47 k, low-noise
R2202 (R2302)	1-242-699-09	12 k, low-noise
R2203 (R2303)	1-242-713-09	47 k, low-noise
R2204 (R2304)	1-242-713-09	47 k, low-noise
R2205 (R2305)	1-242-697-09	10 k, low-noise
R2206 (R2306)	1-242-679-00	1.8 k
R2207 (R2307)	1-242-685-00	3.3 k
R2208 (R2308)	1-242-731-00	270 k
R2209 (R2309)	1-242-713-00	47 k
R2210 (R2310)	1-242-717-09	68 k, low-noise
R2211 (R2311)	1-242-697-00	10 k
R2212 (R2312)	1-242-703-00	18 k
R2213 (R2313)	1-242-649-00	100
R2214 (R2314)	1-242-683-00	2.7 k
R2215 (R2315)	1-242-729-00	220 k
R2216 (R2316)	1-242-697-00	10 k
R2217 (R2317)	1-221-979-00	22 k-(B), adjustable
R2218	1-242-697-00	10 k
(R2318)	1-242-679-00	1.8 k
R2219 (R2319)	1-242-731-00	270 k
R2220 (R2320)	1-242-707-00	27 k
R2221 (R2321)	1-242-723-00	120 k
R2222 (R2322)	1-242-675-00	1.2 k

Note: Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*
R2223 (R2323)	1-242-681-00	2.2 k
R2224 (R2324)	1-242-709-00	33 k
R2225 (R2325)	1-242-679-00	1.8 k
R2226 (R2326)	1-242-681-00	2.2 k
R2227 (R2327)	1-242-667-00	560
R2228 (R2328)	1-221-979-00	22 k-(B), adjustable
R2229 (R2329)	1-242-697-00	10 k
R2230 (R2330)	1-242-705-00	22 k
R2231 (R2331)	1-242-729-00	220 k
R2232 (R2332)	1-242-709-00	33 k
R2233 (R2333)	1-242-689-00	4.7 k
R2234 (R2334)	1-242-673-00	1 k
R2235 (R2335)	1-221-606-00	100-(B), adjustable
R2236 (R2336)	1-242-649-00	100
R2237 (R2337)	1-242-697-00	10 k
R2238 (R2338)	1-242-697-00	10 k
R2239 (R2339)	1-242-721-00	100 k
R2240 (R2340)	1-242-667-00	560
R2241	1-242-681-00	2.2 k
(R2341)	1-242-703-00	18 k
R2242	1-242-717-00	68 k
R2243 (R2343)	1-242-697-00	10 k
R2244		--------------
(R2344)	1-242-709-00	33 k
R2245 (R2345)		--------------
R2246	1-242-697-00	10 k
R2247	1-242-679-00	1.8 k
R2248	1-242-703-00	18 k
R2249	1-221-979-00	22 k-(B), adjustable
R2250	1-242-697-00	10 k
R2251		--------------
R2252	1-242-709-00	33 k
R2253	1-242-703-00	18 k

Ref. No.	*Part No.*	*Description*
R2401	1-222-805-00	470-(B), adjustable (Se. No. up to 19,100)
	1-209-044-00	100 ±5% 1W (Se. No. 19,101 and later)
R2402	1-242-701-00	15k
R2403	1-242-697-00	10k
R2404	1-242-697-00	10k (Se. No. up to 19,100)
	1-242-705-00	22k (Se. No. 19,101 and later)
R2405	1-242-663-00	390 (Se. No. up to 19,100)
	1-242-683-00	2.7k (Se. No. 19,101 and later)
R2406	1-244-825-00	10 ±5% ½W carbon (Se. No. up to 19,100)
	1-242-675-00	1.2k (Se. No. 19,101 and later)
R2407	1-244-825-00	10 ±5% ½W carbon (Se. No. up to 19,100)
	1-242-625-00	10 (Se. No. 19,101 and later)
R2408	1-242-625-00	10 (Se. No. 19,101 and later)
R2502	1-242-667-00	560
R3001	1-242-709-00	33 k
R3002	1-242-705-00	22 k
R3003	1-242-715-00	56 k
R3004	1-242-685-00	3.3 k
R3005	1-242-679-00	1.8 k
R3006	1-242-737-00	470 k
R3007	1-242-689-00	4.7 k
R3008	1-242-703-00	18 k
R3009	1-244-881-00	2.2 k ±5% ½W carbon
R3010	1-242-717-00	68 k
R3011	1-242-689-00	4.7 k
R3012	1-242-689-00	4.7 k
R3013	1-242-709-00	33 k
R3014	1-222-783-00	47 k-(B), adjustable
R3015	1-242-693-00	6.8 k
R3016	1-242-709-00	33 k
R3017	1-242-783-00	47 k-(B), adjustable
R3018	1-242-691-00	5.6 k
R3019	1-242-709-00	33 k
R3020	1-222-783-00	47 k-(B), adjustable
R3021	1-242-691-00	5.6 k
R3022	1-242-687-00	3.9 k
R3023	1-242-697-00	10 k
R3024	1-242-699-00	12 k
R3025	1-242-701-00	15 k
R3026	1-244-881-00	2.2 k ±5% ½W carbon
R3027	1-242-717-00	68 k
R3028	1-242-689-00	4.7 k
R3029	1-242-689-00	4.7 k
R3030	1-242-709-00	33 k
R3031	1-222-783-00	47 k-(B), adjustable
R3032	1-242-693-00	6.8 k

Note: Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*
R3033	1-242-709-00	33 k
R3034	1-221-979-00	22 k-(B), adjustable
R3035	1-242-689-00	4.7 k
R3036		---------------
R3037	1-222-783-00	47 k-(B), adjustable
R3038	1-242-712-00	43 k
R3039	1-242-665-00	470
R3040	1-244-875-00	1.2 k ±5% ½W carbon
R3041	1-242-705-00	22 k
R3042	1-242-709-00	33 k
R3043	1-242-709-00	33 k
R3044	1-242-709-00	33 k
R3045	1-242-675-00	1.2 k
R3046	1-242-659-00	270
R3047	1-242-693-00	6.8 k
R3048	1-242-697-00	10 k
R3049	1-242-709-00	33 k
R3050	1-242-689-00	4.7 k
R3051	1-242-663-00	390
R3052	1-242-643-00	56 k
R3053	1-242-697-00	10 k
R3054	1-242-697-00	10 k
R3055	1-242-697-00	10 k
R3056	1-242-683-00	2.7 k
R3057		---------------
R3058	1-222-845-00	100 k-(B), adjustable
R3059	1-242-709-00	33 k
R3060	1-242-683-00	2.7 k
R3061	1-242-709-00	33 k
R3062	1-242-709-00	33 k
R3063	1-242-685-00	3.3 k
R3064	1-242-689-00	4.7 k
R3065	1-242-689-00	4.7 k
R3066	1-242-665-00	470
R3067	1-242-707-00	27 k
R3068	1-242-705-00	22 k
R3069	1-242-709-00	33 k
R3070	1-242-689-00	4.7 k
R3071	1-242-709-00	33 k
R3072	1-242-697-00	10 k
R3073	1-242-715-00	56 k
R3074	1-242-703-00	18 k
R3075	1-242-673-00	1 k
R3076	1-242-677-00	1.5 k
R3077	1-242-697-00	10 k
R3078	1-242-673-00	1 k
R3079	1-222-845-00	100 k-(B), adjustable
R3080	1-222-845-00	100 k-(B), adjustable
R3081	1-242-713-00	47 k
R3082	1-242-707-00	27 k
R3083	1-242-697-00	10 k
R3084	1-242-691-00	5.6 k
R3085	1-242-713-00	47 k

Ref. No.	*Part No.*	*Description*
R3086	1-242-731-00	270 k
R3087	1-242-699-00	12 k
R3088	1-242-705-00	22 k
R3089	1-242-717-00	68 k
R3090	1-242-707-00	27 k
R3091	1-242-697-00	10 k
R3092	1-242-691-00	5.6 k
R3093	1-244-721-00	100 k
R4001	1-242-649-00	100
R4002	1-242-691-00	5.6 k
※ R4003	1-206-457-00	5.6 ±5% 2W metal-oxide
	1-206-463-00	10 ±5% 2W metal-oxide
R4004	1-206-457-00	5.6 ±5% 2W metal-oxide
R4005	1-242-691-00	5.6 k
R4006	1-242-705-00	22 k
R4007	1-242-719-00	82 k
R4008	1-242-691-00	5.6 k
R4009	1-242-719-00	82 k
R4010	1-242-715-00	56 k
R4011	1-242-719-00	82 k
R4012	1-242-719-00	82 k
R4013	1-242-715-00	56 k
R4014	1-242-719-00	82 k
R4015	1-242-673-00	1 k
R4016	1-242-719-00	82 k
R4017	1-242-715-00	56 k
R4018	1-242-691-00	5.6 k
R4019	1-242-719-00	82 k
R4020	1-242-715-00	56 k
R4021	1-242-691-00	5.6 k
R4022	1-242-697-00	10 k
R4023	1-242-715-00	56 k
R4024	1-242-705-00	22 k
R4025	1-242-715-00	56 k
R4026	1-242-705-00	22 k
R4027	1-242-719-00	82 k
R4028	1-242-691-00	5.6 k
R4029	1-242-691-00	5.6 k
R4030	1-242-715-00	56 k
R4031	1-242-721-00	100 k
R4032	1-242-715-00	56 k
R4033	1-242-709-00	33 k
R4034	1-242-719-00	82 k
R4035	1-242-689-00	4.7 k
R4036	1-242-695-00	8.2 k
※ R4037	1-242-720-00	91 k
	1-242-721-00	100 k
	1-242-722-00	110 k
	1-242-723-00	120 k
R4038	1-242-709-00	33 k
R4039	1-242-717-00	68 k
R4040	1-242-689-00	4.7 k
R4041	1-242-705-00	22 k
R4042	1-242-721-00	100 k
R4043	1-242-691-00	5.6 k
R4044	1-242-691-00	5.6 k
R4045	1-242-715-00	56 k
R4046	1-242-705-00	22 k
R4047	1-242-715-00	56 k
R4048	1-222-845-00	100 k-(B), ±25% adjustable
R4049	1-242-691-00	5.6 k
R4050	1-242-719-00	82 k
R4051	1-242-719-00	82 k
R4052	1-242-715-00	56 k
R4053	1-206-642-00	120 ±5% 2W metal-oxide
R4054	1-242-719-00	82 k
R4055	1-242-719-00	82 k
R4056	1-242-715-00	56 k
R4057	1-242-691-00	5.6 k
R4058	1-242-719-00	82 k
R4059	1-242-719-00	82 k
R4060	1-242-719-00	82 k
R4061	1-242-715-00	56 k
R4062	1-242-691-00	5.6 k
R4063	1-242-705-00	22 k
R4064	1-242-715-00	56 k
R4065	1-242-697-00	10 k
R4066	1-242-693-00	6.8 k
R4067	1-242-721-00	100 k
R4068	1-242-689-00	4.7 k
R4069	1-242-717-00	68 k
R4070	1-242-709-00	33 k
R4071	1-242-689-00	4.7 k
R4072	1-242-677-00	1.5 k
R4073	1-242-729-00	220 k
R4074	1-242-689-00	4.7 k
R4075	1-242-709-00	33 k
R4076	1-242-667-00	560
※ R4077	1-242-731-00	270 k
	1-242-732-00	300 k
R4078	1-242-717-00	68 k
R4079	1-242-689-00	4.7 k
R4080	1-242-697-00	10 k
R4081	1-242-715-00	56 k
R4082	1-242-715-00	56 k
R4083	1-242-697-00	10 k
R4084	1-242-725-00	150 k
R4085	1-242-691-00	5.6 k
R4086	1-242-709-00	33 k
R4087	1-242-705-00	22 k
R4088	1-242-691-00	5.6 k
R4089	1-242-723-00	120 k
R6001	1-242-646-00	75

※ should be selected

Ref. No.	*Part No.*	*Description*
R6002	1-242-691-00	5.6 k (Se. No. up to 11,000)
	1-244-698-00	11 k (Se. No. 11,001 and later)
R6003	1-242-693-00	6.8 k (Se. No. up to 11,000)
	1-242-630-00	16 (Se. No. 11,001 and later)
R6004	1-242-691-00	5.6 k (Se. No. up to 11,000)
	1-244-698-00	11 k (Se. No. 11,001 and later)
R6005	1-242-693-00	6.8 k (Se. No. up to 11,000)
	1-242-630-00	16 (Se. No. 11,001 and later)
R6006	1-222-696-00	100 k-(B), variable with switch (TRACKING)
R6007	1-222-695-00	1 k-(B), variable with switch (COLOR LOCK)
R6008	1-244-729-00	220 k
R6101	1-242-695-00	8.2 k
R6102	1-242-677-00	1.5 k
R6103	1-242-669-00	680
R6104	1-222-804-00	1 k-(B), adjustable
R6105	1-242-669-00	680
R6106	1-242-671-00	820
R6107	1-209-044-00	100
R6108	1-242-669-00	680
R6109	1-242-663-00	390
R6110	1-221-997-00	2.2 k-(B), adjustable
R6111	1-242-683-00	2.7 k
R6112	1-242-676-00	1.3 k
R6113	1-242-669-00	680
R6114	1-222-804-00	1 k-(B), adjustable
R6115	1-242-669-00	680
R6201	1-244-681-00	2.2 k
R6202	1-244-681-00	2.2 k
R6203	1-244-739-00	560 k
R6204	1-244-739-00	560 k
R6205	1-244-646-00	75
R6206	1-210-583-00	36 ±5% ½W carbon
R7001	1-242-649-00	100
R7002	1-242-711-00	39 k
R7003	1-242-697-00	10 k
R7004	1-242-673-00	1 k
R7005	1-242-649-00	100
R7006	1-242-701-00	15 k
R7007	1-242-697-00	10 k
R7008	1-242-673-00	1 k
R7009	1-242-673-00	1 k
R7010	1-222-701-00	10 k-(B), adjustable
R8201	1-244-703-00	18 k
R8202	1-244-624-00	9.1
R8203	1-244-637-00	33
R8204	1-244-660-00	300
R8205	1-244-677-00	1.5 k

Ref. No.	*Part No.*	*Description*
R8206	1-244-651-00	120
R8207	1-244-671-00	820
R8208	1-244-673-00	1 k
R8209	1-244-666-00	510
R8210	1-244-685-00	3.3 k
R8211	1-244-651-00	120
R8212	1-244-679-00	1.8 k
R8213	1-244-667-00	560
R8214	1-244-689-00	4.7 k
R8215	1-244-695-00	8.2 k
R8216	1-244-675-00	1.2 k
R8217	1-244-691-00	5.6 k
R8218		---------------
R8219	1-244-699-00	12 k
R8220	1-244-657-00	220
R8221	1-244-671-00	820
R8222	1-244-673-00	1 k
R8223	1-244-649-00	100
R8224	1-244-721-00	100 k
R8225	1-244-665-00	470
R8226	1-244-661-00	330
R8227	1-244-683-00	2.7 k
R8228	1-244-689-00	4.7 k
R8229	1-244-705-00	22 k
R8230	1-244-649-00	100
R8231	1-244-649-00	100
R8232	1-244-643-00	56
R8233	1-244-673-00	1 k
R8234	1-244-663-00	390
R8235	1-244-697-00	10 k
R8236	1-244-687-00	3.9 k
R8237	1-244-705-00	22 k
R8238	1-244-649-00	100
R8239	1-206-055-00	100 ±10% 2W metal-oxide
R8240	1-206-085-00	220 ±10% 1W metal-oxide
R8241	1-206-126-00	390 ±10% 2W metal-oxide
R8242	1-244-697-00	10 k
R8243	1-244-705-00	22 k
R8244	1-242-687-00	3.9 k
R8245		---------------
R8246	1-244-665-00	470
R8247	1-242-717-00	68 k
R8248	1-244-705-00	22 k
R8249	1-244-673-00	1 k
R8250	1-244-511-00	39 k
R8251	1-244-858-00	240 ½W
R8252	1-244-693-00	6.8 k
R8253	1-244-649-00	100
R8254	1-244-697-00	10 k
R8255	1-244-659-00	270
R8256	1-244-673-00	1 k
R8257	1-244-649-00	100
R8258	1-244-673-00	1 k

Ref. No.	*Part No.*	*Description*
R8259	1-244-691-00	5.6 k
R8260	1-244-673-00	1 k
R8261		--------------
R8262	1-244-665-00	470
R8263	1-244-689-00	4.7 k
R8264	1-244-659-00	270
R8265		--------------
R8266	1-244-695-00	8.2 k
R8267	1-244-669-00	680
R8503	1-244-637-00	33
R8504	1-244-701-00	15 k
R8505	1-244-697-00	10 k
R8506	1-244-697-00	10 k
R8507	1-244-701-00	15 k
R8508	1-244-709-00	33 k
R8509		--------------
R8510	1-244-673-00	1 k
VR6201	1-222-805-00	470-(B), adjustable (tuner agc)
VR6202	1-221-986-00	330-(B), adjustable (SND REJ)
VR6203	1-222-804-00	1 k-(B), adjustable (agc)

SWITCHES

S6001	1-514-140-00	switch, push (POWER)
S6002	1-514-674-00	switch, slide (STOP)
S6003	1-514-673-00	switch, slide (PLAY)
S6004	1-514-674-00	switch, slide (F. FWD)
S6005	1-514-674-00	switch, slide (REWIND)
S6006	1-514-932-00	switch, slide (antenna switch)
S6007		--------------
S6008	1-514-941-00	switch, slide (CHANNEL SELECTOR)
S6009	1-514-039-00	switch, micro (cassette in switch)
S6010	1-514-730-00	switch, micro (threading switch)
S6011	1-514-730-00	switch, micro (threading switch)
S6012	1-514-730-00	switch, micro (ac motor build-up switch)
S6013	1-514-693-00	switch, slide (Se. No. up to 11,000) (VHF AUDIO SELECTOR)
	1-516-039-00	switch, slide (Se. No. 11,001 and later) (AUDIO SELECTOR)
S6014	1-514-459-00	switch, slide (MONITOR SELECTOR)
S6015		--------------
S6016	1-514-730-12	switch, micro (record safety switch)
S6017	1-514-964-00	switch, slide (RECORD BUTTON)
S6018	1-514-964-00	switch, slide (AUDIO/DUB)
S6019	1-514-803-00	switch, slide (RECORD BUTTON)
S6020	1-514-730-12	switch, micro (record/dubbing)
S6021	1-514-449-00	switch, slide (Se. No. 11,001 and later) (HEADPHONE LEVEL)
S6201	1-514-963-11	switch, lever/slide (INPUT SIGNAL SELECTOR)

FILTERS

FL1501	1-231-178-00	filter, band-pass (B); 3.58 MHz
FL1502	1-231-179-00	filter, band-pass (C); 4.27 MHz
FL1503	1-231-180-00	filter, low-pass (B)
FL6001	1-231-183-00	filter, band-pass; 3.58 MHz
FL6002	1-231-182-00	filter, low-pass

MISCELLANEOUS

CP4001 CP4006	1-101-534-00	encapsulated component, 0.1μF + 120Ω
	1-454-085-00	solenoid, C
PM6001 PM6002	1-454-085-00	solenoid, B
CN6010 CN6011 CN6208 CN6209 CN6210	1-506-186-12	phono plug, 2-P
CN6012	1-507-251-00	jack, mini (Se. No. 11,001 and later)
CN6013	1-507-282-00	jack, HEADPHONE (Se. No. 11,001 and later)
CN6007	1-507-142-00	phono jack, 2-P
CN6201	1-507-142-13	phono jack, 2-P
CN6202 CN6203	1-507-251-00	jack (mini)
CN6211 CN6212	1-507-359-00	phono jack
CN6206	1-508-033-12	housing (red), amplok
CN6207	1-508-033-20	housing (white), amplok
CN6001	1-508-379-11	AC input connector, 3-P

Note: Se. No. means Serial Number

Ref. No.	*Part No.*	*Description*
CN6005 CN6204	1-509-502-21	output connector, COAXIAL cable
CN6002	1-509-332-11	AC socket, 3-P
CN6004	1-509-462-11	input connector COAXIAL cable
RY4002	1-515-125-00	relay
RY4003	1-515-125-00	relay
RY1401	1-515-148-11	relay
RY1402	1-515-148-11	relay
RY2001	1-515-148-00	relay
RY2101	1-515-148-00	relay
RY4001	1-515-149-00	relay
CN6006	1-517-051-00	socket, photo transistor lamp
PL6001	1-518-082-00	lamp, pilot (2V/100 mA); POWER
PL6002	1-518-140-00	lamp, pilot (14 V/80mA); STAND BY (Se. No. 10,920 and later)
	1-518-082-00	lamp, pilot (2V/100mA); STAND BY (Se. No. up to 10,919)
PL6201	1-518-082-00	lamp, pilot (2V/100 mA) TUNING METER
PL6003	1-518-118-00	lamp, photo transistor (6V/200 mA); PHOTO TRANSISTOR
	1-520-109-00	meter, tuning
PL6004	1-518 082-12	lamp, pilot (2V/100 mA); RECORD

Ref. No.	*Part No.*	*Description*
X1501	1-527-186-00	crystal
X1001	1-527-190-00	crystal, osc (4.26 MHz)
F6101	1-532-118-12	fuse 1.6A
F6102	1-532-120-12	fuse 2.5A
F6001	1-532-298-00	fuse 2.0A
	1-533-048-00	fuse post
	1-536-080-11	pincontact, amplok
CN6205	1-536-269-13	terminal strip (ANTENNA)
	1-536-296-00	terminal strip, 1L2L1
CN6003	1-536-328-00	antenna terminal
	1-536-329-00	terminal strip, 14-P
	1-581-248-11	board, T
	1-581-404-00	board, W
	8-825-520-00	ERASE HEAD
RPH	8-829-158-30	AUDIO/CTL HEAD (Se. No. up to 11,386)
	8-829-158-32	AUDIO/CTL HEAD (Se. No. 11,387 and later)
M6001	8-831-634-20	AC motor
M6002	8-834-016-01	DC motor
	X-36320-01-0	connector, intermidiary; VHF

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SUPPLEMENT 1

MODEL VO-1600
July, '72

This supplement updates the service manual to include production changes on circuit or printed circuit boards.

1. A-R BOARD MODIFICATIONS

(a) Parts Added

Ref. No.	Description	Applicable Serial No.	Remarks
C648	0.047μF 50V, ceramic (1-101-006-00)	10,151 and later	See Fig. 1-a See Fig. 1-b
C651	56pF ±5% 50V, silvered mica (1-107-079-00)	10,345 and later	See Fig. 1-a See Fig. 1-c
R757	680 ohm ±5% ¼W, carbon (1-242-669-00)		

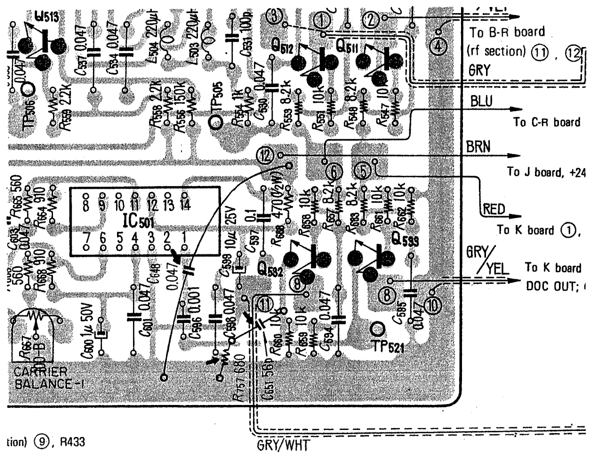

To B-R board (rf section) ⑪, ⑫
GRY
BLU
To C-R board
BRN
To J board, +24
RED
To K board ①,
GRY/YEL
To K board DOC OUT;
IC501
TP521
CARRIER BALANCE-I
GRY/WHT

Fig. 1-a

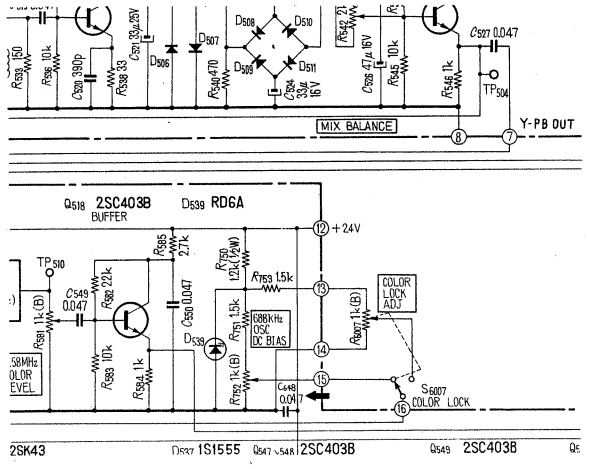

C527 0.047
TP504
MIX BALANCE
Y-PB OUT
Q516 2SC403B BUFFER
D539 RD6A
+24V
COLOR LOCK ADJ
686kHz OSC DC BIAS
S607 COLOR LOCK
2SK43
1S1555
2SC403B
2SC403B

Fig. 1-b

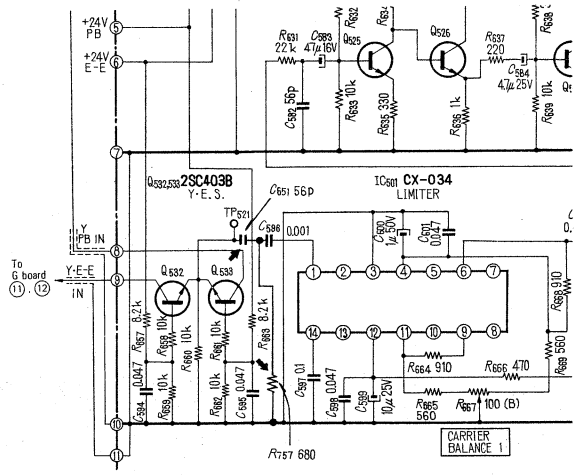
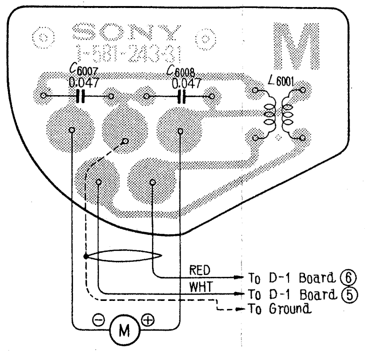

+24V PB
+24V E-E
Q532,533 2SC403B Y-E.S.
C651 56P
IC501 CX-034 LIMITER
TP521
Y PB IN
To G board ⑪, ⑫
Y-E-E IN
Q532
Q533
R757 680
CARRIER BALANCE I

Fig. 1-c

2. M BOARD CHANGED (Serial No. 11,241 and later)

Filter circuit and printed circuit board changed.

New Board (Part No. X-36302-99-1)


SONY
1-581-243-31
M
C6007 0.047
C6008 0.047
L6001
RED
WHT
To D-1 Board ⑥
To D-1 Board ⑤
To Ground
M

3. "D" BOARD (System Control) CHANGED TO "D-1" BOARD

"D" and "Y" boards were combined and changed to "D-1" board with some circuit modifications as shown on pages 4 and 5.

Applicable Serial Numbers .... 10,401 and later

	Part No.			Part No.
D board, complete	8-985-304-00	→	D-1 board	8-985-304-10
Y board, complete	....			

Note: D-1 board parts list is given on page 10.

4. C-R, N and VHF/AUDIO SWITCH BOARDS CHANGED

These three boards changed due to additional Audio Monitor circuit and Headphone jack as follows:

Applicable Serial Numbers .... 11,001 and later

	Part No.			Part No.
C-R board, complete	8-985-303-01	→	C-R board, complete	8-985-303-11
N board, complete	....	→	Nh board, complete	X-36302-98-1
VHF/AUDIO switch board	....	→	Ph board, complete	X-30302-97-1

Note: New boards schematic and mounting diagrams are shown on pages 5 ~ 7, and their parts list are given on page 12.

5. MOUNTING DIAGRAMS OF Q AND W BOARDS

See page 8.

6. BLOCK DIAGRAM OF NEW C-R BOARD

See page 8.

7. FRAME WIRING DIAGRAM – Main Chassis Section –

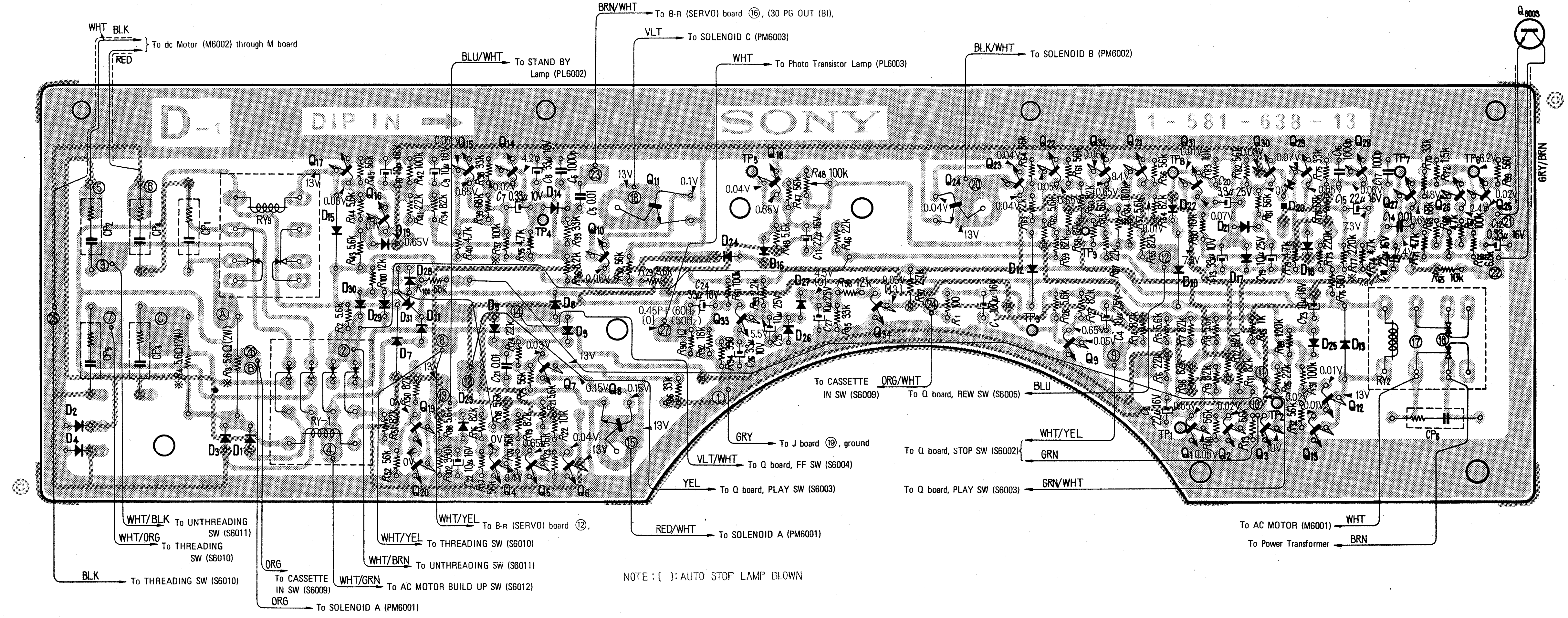
New frame wiring diagram including D-1 board, and additional audio monitor circuit is shown on page 9.

8. FRAME WIRING DIAGRAM – Record Pack Section – MOUNTING DIAGRAM – T Board –

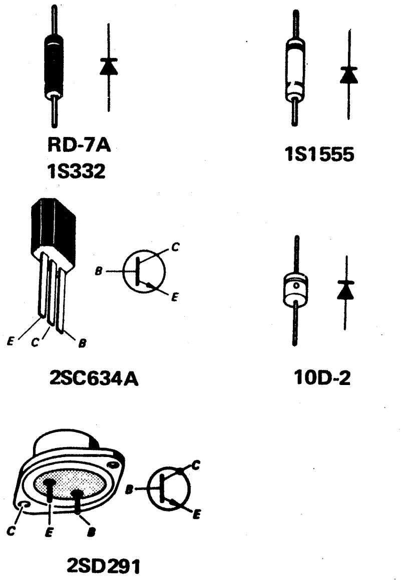
These diagrams show the wiring modifications preventing a momentary loss of audio gain when switching from EXT to TV. See page 10.

MOUNTING DIAGRAM

– D-1 Board – (Serial No. 10,401 and later) Part No. 8-985-304-10


D-1
DIP IN
SONY
1-581-638-13
WHT BLK RED
To dc Motor (M6002) through M board
BLU/WHT To STAND BY Lamp (PL6002)
BRN/WHT To B-R (SERVO) board ⑯, (30 PG OUT (8)).
VLT To SOLENOID C (PM6003)
WHT To Photo Transistor Lamp (PL6003)
BLK/WHT To SOLENOID B (PM6002)
Q6003
GRY/BRN
WHT/BLK To UNTHREADING SW (S6011)
WHT/ORG To THREADING SW (S6010)
BLK To THREADING SW (S6010)
ORG To CASSETTE IN SW (S6009)
ORG To SOLENOID A (PM6001)
WHT/YEL To THREADING SW (S6010)
WHT/BRN To UNTHREADING SW (S6011)
WHT/GRN To AC MOTOR BUILD UP SW (S6012)
WHT/YEL To B-R (SERVO) board ⑫.
RED/WHT To SOLENOID A (PM6001)
NOTE : [ ]: AUTO STOP LAMP BLOWN
To CASSETTE IN SW (S6009) ORG/WHT
To Q board, REW SW (S6005) BLU
GRY To J board ⑲, ground
VLT/WHT To Q board, FF SW (S6004)
YEL To Q board, PLAY SW (S6003)
To Q board, STOP SW (S6002) WHT/YEL GRN
To Q board, PLAY SW (S6003) GRN/WHT
To AC MOTOR (M6001) WHT
To Power Transformer BRN
RY1 RY2 RY3
CP1 CP2 CP3 CP4 CP5 CP6
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9

Note: [ ]: AUTO STOP LAMP BLOWN.
D31 is mounted on conductor side.


RD-7A
1S332
1S1555
2SC634A
10D-2
2SD291
E C B

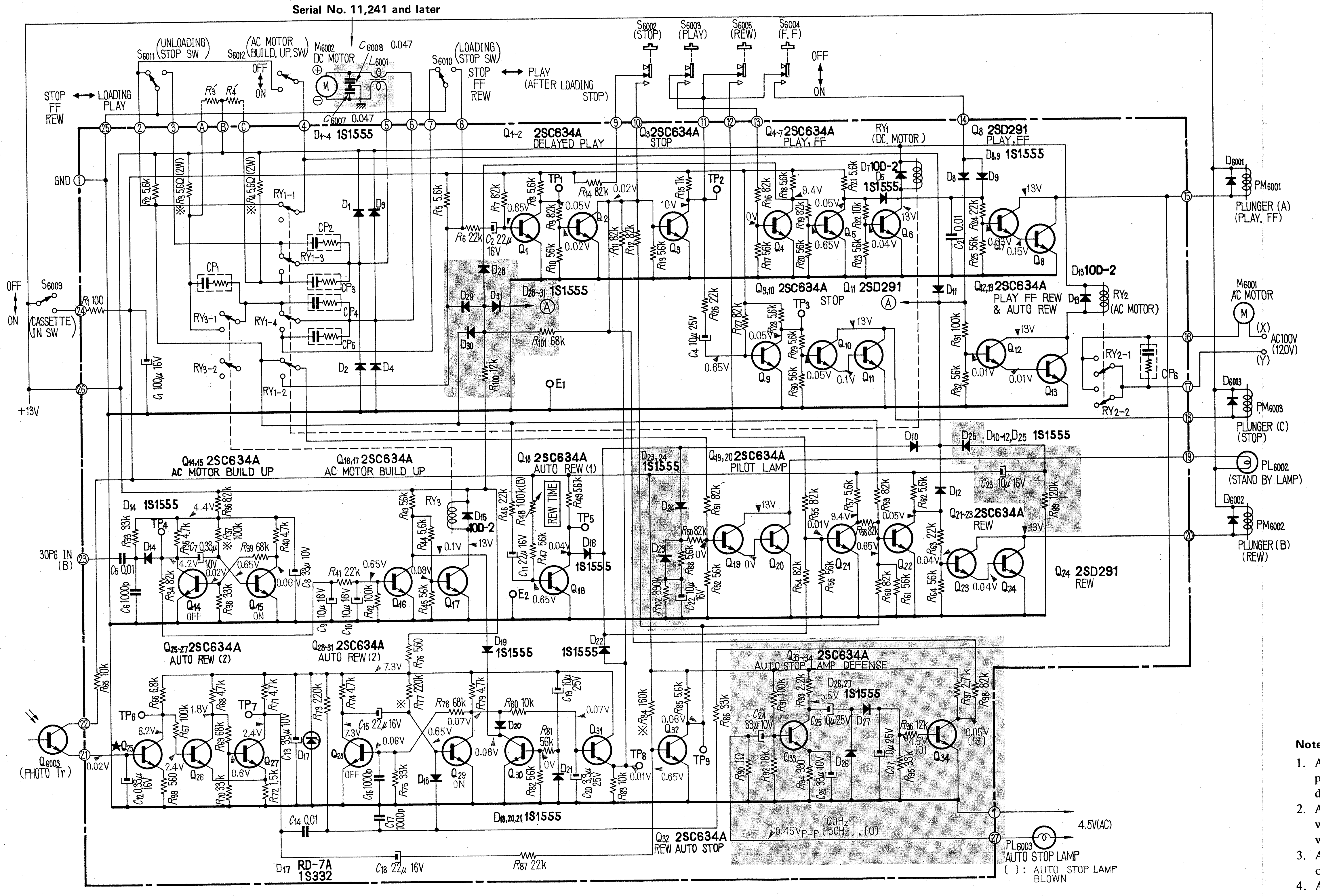
Q1	2SC634A
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	2SD291
Q9	2SC634A
Q10	
Q11	2SD291
Q12	2SC634A
Q13	
Q14	
Q15	
Q16	
Q17	
Q18	
Q19	
Q20	
Q21	
Q22	
Q23	
Q24	2SD291
Q25	2SC634A
Q26	
Q27	
Q28	
Q29	
Q30	
Q31	
Q32	
Q33	
Q34	

D1	1S1555
D2	
D3	
D4	
D5	
D7	10D-2
D8	1S1555
D9	
D10	
D11	
D12	
D13	10D-2
D14	1S1555
D15	10D-2
D16	1S1555
D17	RD-7A or 1S332
D18	1S1555
D19	
D20	
D21	
D22	
D23	1S1555
D24	
D25	
D26	
D27	
D28	
D29	
D30	
D31	

Note: All reference numbers of components or test points in this diagram are in 4000 series.

SCHEMATIC DIAGRAM

– D-1 Board – (Serial No. 10,401 and later)


Serial No. 11,241 and later
S6011 (UNLOADING STOP SW)
S6012 (AC MOTOR BUILD. UP. SW)
M6002 DC MOTOR
C6008 0.047
L6001
C6007 0.047
S6010 (LOADING STOP SW)
STOP ←→ PLAY (AFTER LOADING STOP)
FF
REW
OFF
ON
STOP ←→ LOADING
FF PLAY
REW
S6002 (STOP)
S6003 (PLAY)
S6005 (REW)
S6004 (F.F)
D1-4 1S1555
Q1-2 2SC634A DELAYED PLAY
Q3 2SC634A STOP
Q4-7 2SC634A PLAY, FF
RY1 (DC MOTOR)
Q8 2SD291 PLAY, FF
D8,9 1S1555
D7 10D-2
D5 1S1555
GND
RY1-1
RY1-3
RY1-4
RY1-2
RY3-1
RY3-2
CP1
CP2
CP3
CP4
CP5
D28
D29
D31
D30
D28-31 1S1555
R101 68k
R100 12k
E1
S6009
CASSETTE IN SW
R1 100
C1 100μ 16V
+13V
Q9,10 2SC634A
Q11 2SD291
STOP
TP1
TP2
TP3
D11
D13 10D-2
Q12,13 2SC634A PLAY FF REW & AUTO REW
RY2 (AC MOTOR)
RY2-1
RY2-2
CP6
D6001
PM6001
PLUNGER (A) (PLAY, FF)
M6001 AC MOTOR
AC100V (120V)
D6003
PM6003
PLUNGER (C) (STOP)
PL6002 (STAND BY LAMP)
D6002
PM6002
PLUNGER (B) (REW)
D10
D25
D10-12, D25 1S1555
Q14,15 2SC634A AC MOTOR BUILD UP
Q16,17 2SC634A AC MOTOR BUILD UP
Q18 2SC634A AUTO REW (1)
REW TIME
D15 10D-2
D16 1S1555
D23,24 1S1555
Q19,20 2SC634A PILOT LAMP
D12
Q21-23 2SC634A REW
Q24 2SD291 REW
C23 10μ 16V
R99 120k
D14 1S1555
30PG IN (B)
TP4
TP5
E2
RY3
Q25-27 2SC634A AUTO REW (2)
Q28-31 2SC634A AUTO REW (2)
D19 1S1555
D22 1S1555
Q33-34 2SC634A AUTO STOP LAMP DEFENSE
D26,27 1S1555
Q6003 (PHOTO Tr)
TP6
TP7
TP8
TP9
D17 RD-7A 1S332
D18,20,21 1S1555
C14 0.01
C17 1000p
C18 22μ 16V
R87 22k
Q32 2SC634A REW AUTO STOP
0.45VP-P [60Hz 50Hz], (0)
4.5V(AC)
PL6003 AUTO STOP LAMP
( ): AUTO STOP LAMP BLOWN

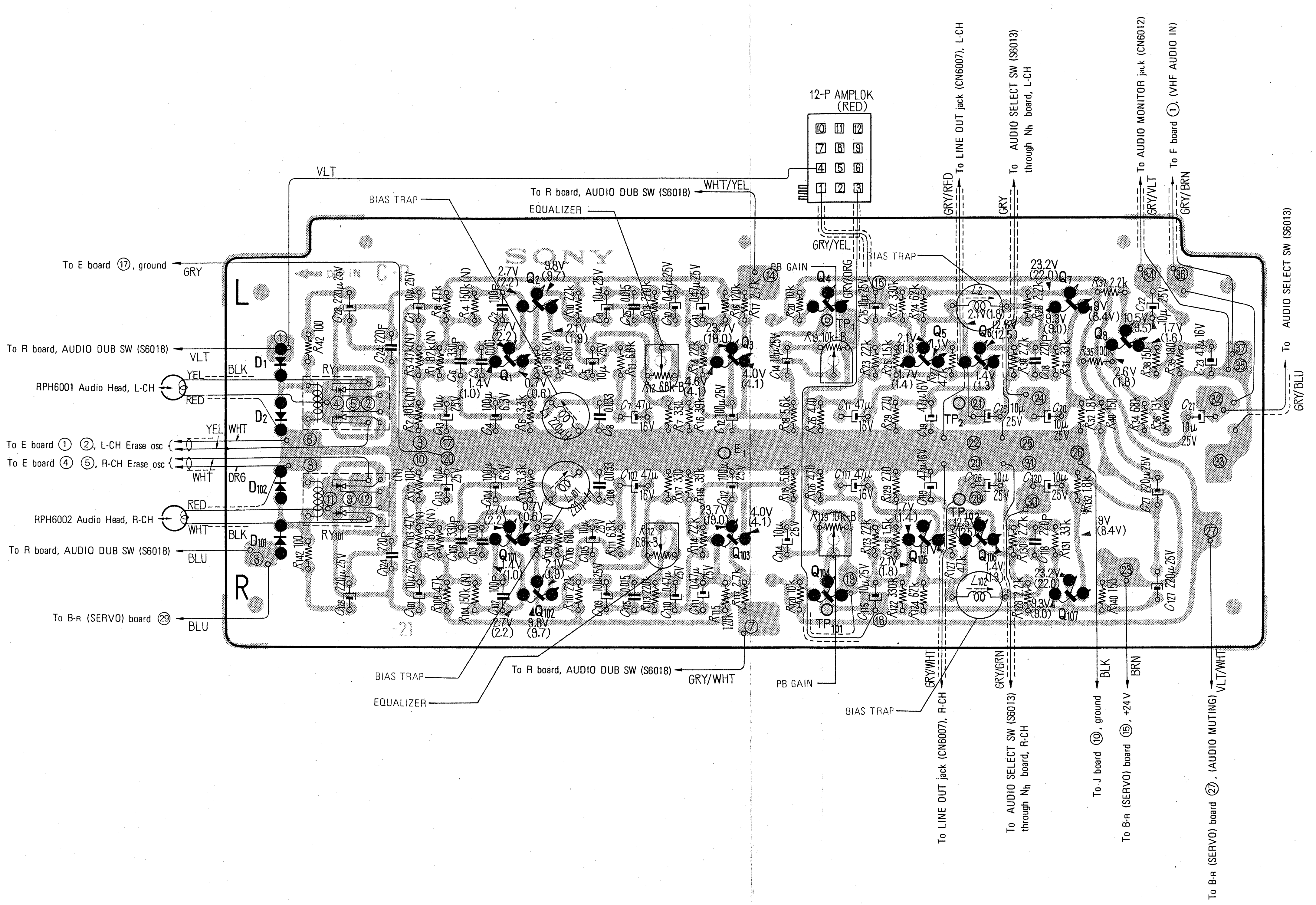
Note: ▨ circuit changed.

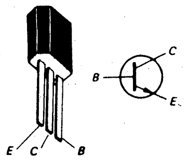
Note:

1. All reference numbers of components or test points in this diagram are in 4000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
3. All resistance values are in ohms. k = 1,000, M = 1,000k
4. All capacitance values are in μF except as indicated with p, which means μμF.

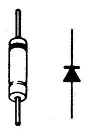
MOUNTING DIAGRAM

– C-R Board – (Serial No. 11,001 and later) Part No. 8-985-303-11

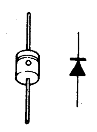

12-P AMPLOK (RED)
VLT
WHT/YEL
To R board, AUDIO DUB SW (S6018)
BIAS TRAP
EQUALIZER
GRY/YEL
BIAS TRAP
PB GAIN
GRY/ORG
SONY
To E board ⑰, ground
GRY
L
To R board, AUDIO DUB SW (S6018)
VLT
RPH6001 Audio Head, L-CH
YEL
BLK
RED
D1
D2
RY1
To E board ① ②, L-CH Erase osc
To E board ④ ⑤, R-CH Erase osc
YEL
WHT
ORG
RPH6002 Audio Head, R-CH
RED
WHT
BLK
D101
D102
RY101
To R board, AUDIO DUB SW (S6018)
BLU
R
To B-R (SERVO) board ㉙
BLU
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q101
Q102
Q103
Q104
Q105
Q106
Q107
TP1
TP2
TP101
TP102
E1
BIAS TRAP
EQUALIZER
To R board, AUDIO DUB SW (S6018)
GRY/WHT
PB GAIN
BIAS TRAP
GRY/RED
To LINE OUT jack (CN6007), L-CH
GRY
To AUDIO SELECT SW (S6013) through Nh board, L-CH
GRY/VLT
To AUDIO MONITOR jack (CN6012)
GRY/BRN
To F board ①, (VHF AUDIO IN)
To AUDIO SELECT SW (S6013)
GRY/BLU
GRY/WHT
To LINE OUT jack (CN6007), R-CH
GRY/GRN
To AUDIO SELECT SW (S6013) through Nh board, R-CH
BLK
To J board ⑩, ground
BRN
To B-R (SERVO) board ⑮, +24V
VLT/WHT
To B-R (SERVO) board ㉗, (AUDIO MUTING)



2SC631A
2SC634A



1S1555



10D-2

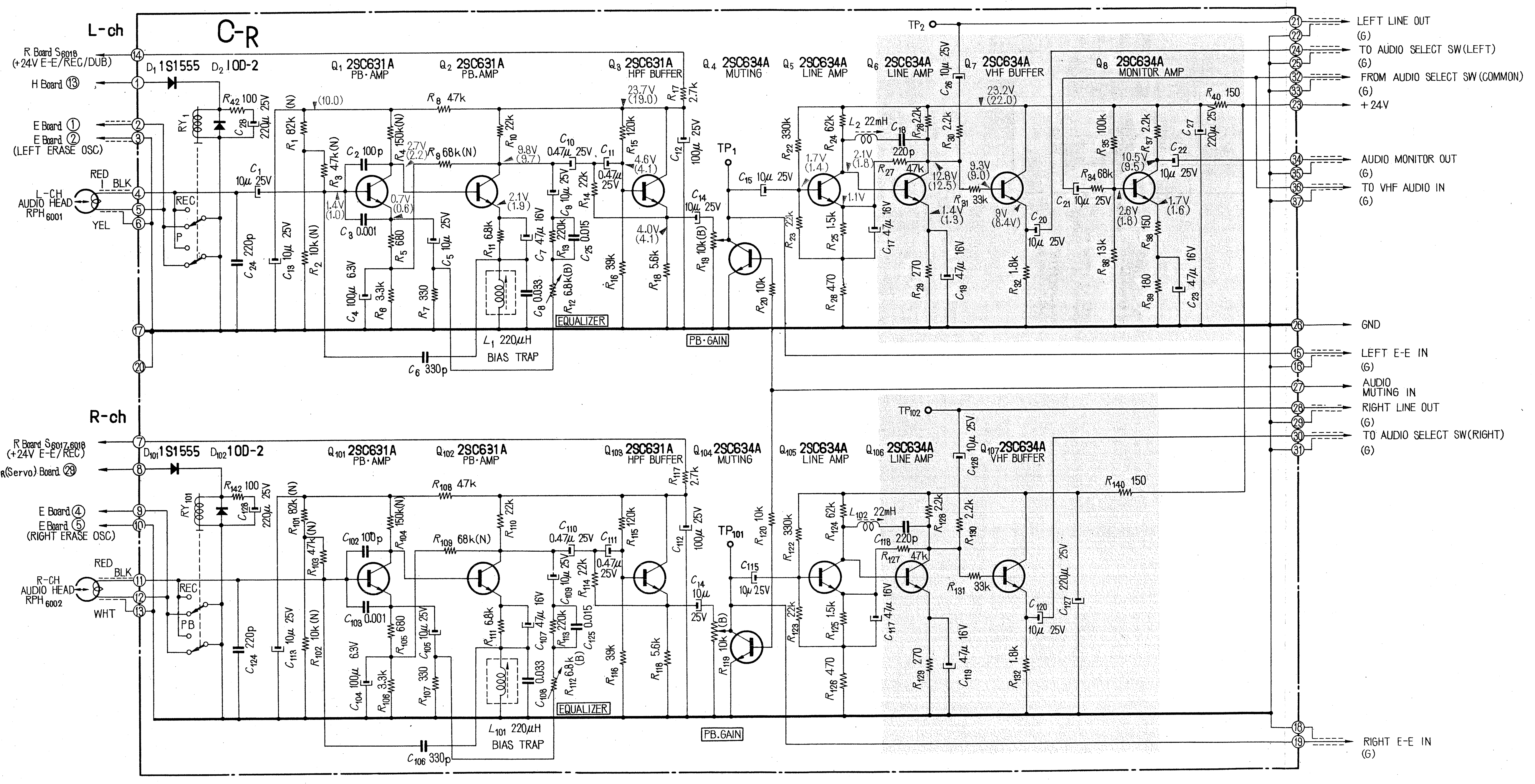
Q1 (Q101) Q2 (Q102) Q3 (Q103)	2SC631A
Q4 (Q104) Q5 (Q105) Q6 (Q106) Q7 (Q107) Q8	2SC634A

D1 (D101)	1S1555
D2 (D102)	10D-2

Note: All reference numbers of components or test points in this diagram are in 2000 series.

SCHEMATIC DIAGRAM

– C-R Board – (Serial No. 11,001 and later)

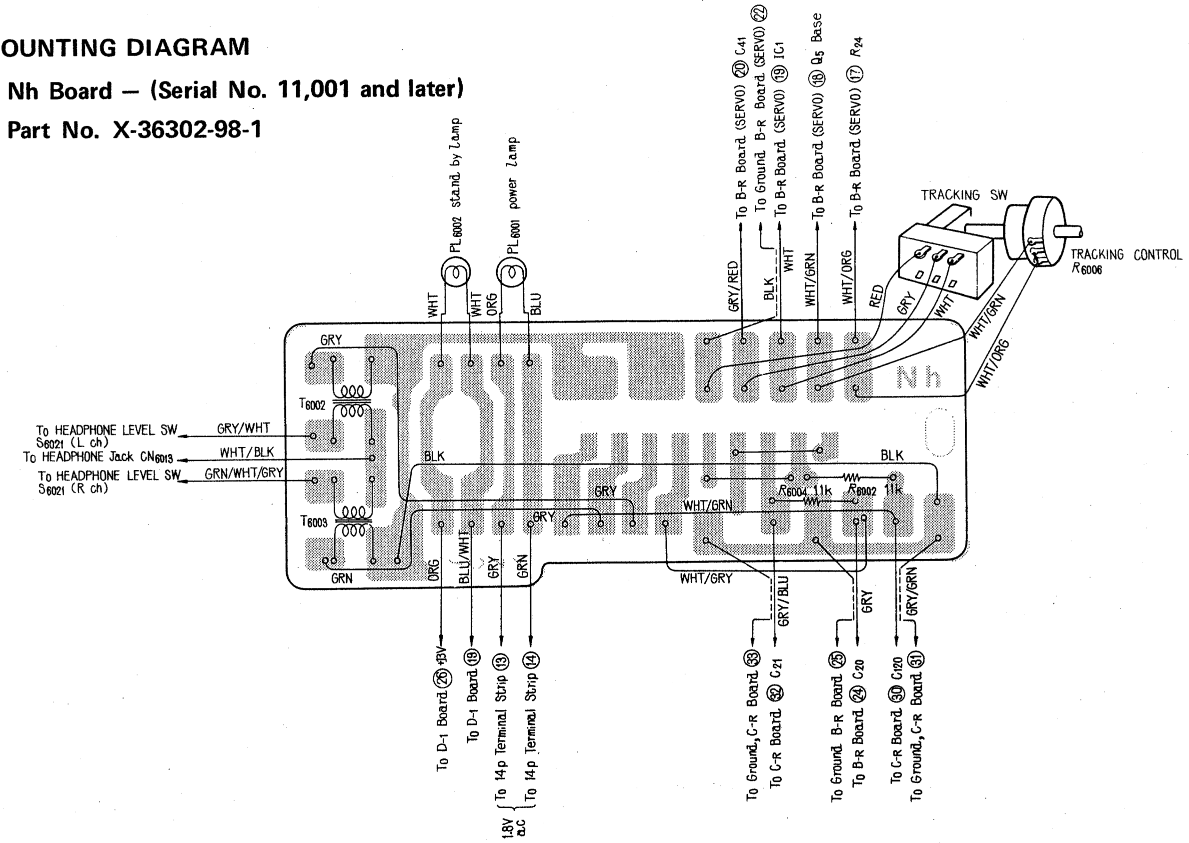

C-R
L-ch
R-ch
R Board S6018 (+24V E-E/REC/DUB)
H Board ⑬
E Board ①
E Board ②
(LEFT ERASE OSC)
L-CH AUDIO HEAD RPH6001
RED
BLK
YEL
REC
P
D1 1S1555
D2 10D-2
RY1
Q1 2SC631A PB·AMP
Q2 2SC631A PB.AMP
Q3 2SC631A HPF BUFFER
Q4 2SC634A MUTING
Q5 2SC634A LINE AMP
Q6 2SC634A LINE AMP
Q7 2SC634A VHF BUFFER
Q8 2SC634A MONITOR AMP
TP1
TP2
EQUALIZER
PB·GAIN
L1 220μH BIAS TRAP
C6 330p
LEFT LINE OUT
TO AUDIO SELECT SW(LEFT)
FROM AUDIO SELECT SW(COMMON)
+24V
AUDIO MONITOR OUT
TO VHF AUDIO IN
GND
LEFT E-E IN
AUDIO MUTING IN
RIGHT LINE OUT
TO AUDIO SELECT SW(RIGHT)
RIGHT E-E IN
(G)
R Board S6017,6018 (+24V E-E/REC)
B-R(Servo) Board ㉙
E Board ④
E Board ⑤
(RIGHT ERASE OSC)
R-CH AUDIO HEAD RPH6002
WHT
PB
D101 1S1555
D102 10D-2
RY101
Q101 2SC631A PB·AMP
Q102 2SC631A PB·AMP
Q103 2SC631A HPF BUFFER
Q104 2SC634A MUTING
Q105 2SC634A LINE AMP
Q106 2SC634A LINE AMP
Q107 2SC634A VHF BUFFER
TP101
TP102
L101 220μH BIAS TRAP
C106 330p

Note:
1. All reference numbers of components or test points in this diagram are in 2000 series.
2. All voltages are dc measured with a VTVM and should hold within ±10%.
( ) represents the dc voltage measured with a VOM (20 kΩ/V).
3. R-CH voltages are same as L-CH.
4. ▨ Circuit changed.

MOUNTING DIAGRAM

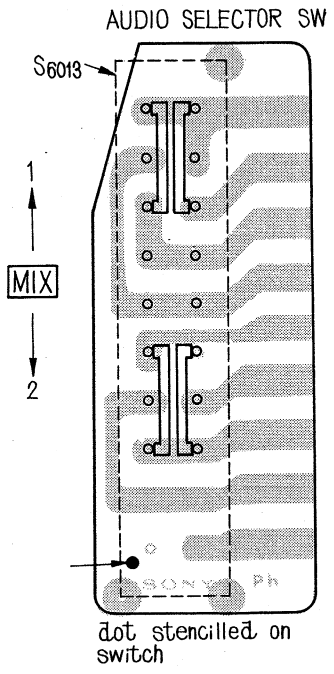
– Nh Board – (Serial No. 11,001 and later)

Part No. X-36302-98-1


PL6002 stand by lamp
PL6001 power lamp
WHT
WHT
ORG
BLU
To B-R Board (SERVO) ⑳ C41
To Ground B-R Board (SERVO) ㉒
To B-R Board (SERVO) ⑲ IC1
To B-R Board (SERVO) ⑱ Q5 Base
To B-R Board (SERVO) ⑰ R24
GRY/RED
BLK
WHT
WHT/GRN
WHT/ORG
TRACKING SW
TRACKING CONTROL R6006
RED
GRY
WHT
WHT/GRN
WHT/ORG
Nh
GRY
T6002
T6003
To HEADPHONE LEVEL SW S6021 (L ch)
GRY/WHT
To HEADPHONE Jack CN6013
WHT/BLK
To HEADPHONE LEVEL SW S6021 (R ch)
GRN/WHT/GRY
BLK
BLK
GRY
GRY
WHT/GRN
R6004 11k
R6002 11k
GRN
ORG
BLU/WHT
GRY
GRN
WHT/GRY
GRY/BLU
GRY
GRY/GRN
To D-1 Board ㉖ +13V
To D-1 Board ⑲
To 14p Terminal Strip ⑬
To 14p Terminal Strip ⑭
1.8V a.c
To Ground, C-R Board ㉝
To C-R Board ㉜ C21
To Ground B-R Board ㉕
To B-R Board ㉔ C20
To C-R Board ㉚ C120
To Ground, C-R Board ㉛

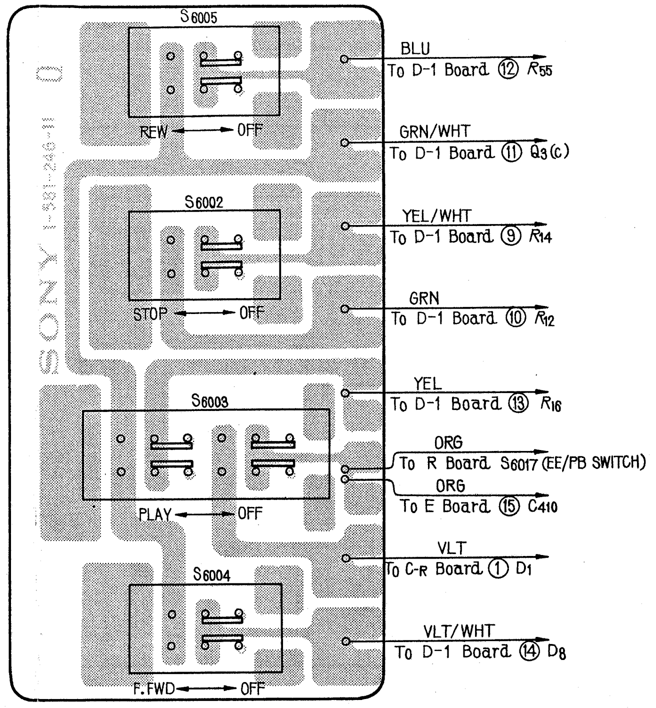
– Ph Board – (Serial No. 11,001 and later)

Part No. X-36302-97-1

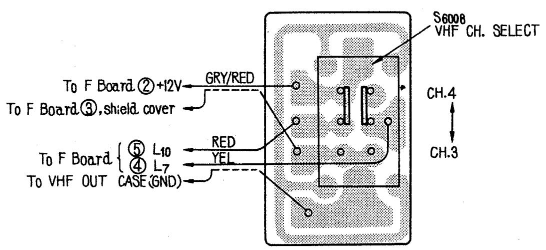

AUDIO SELECTOR SW
S6013
1
MIX
2
SONY
Ph
dot stencilled on switch

MOUNTING DIAGRAM

– Q Board – Part No. X-36303-81-1

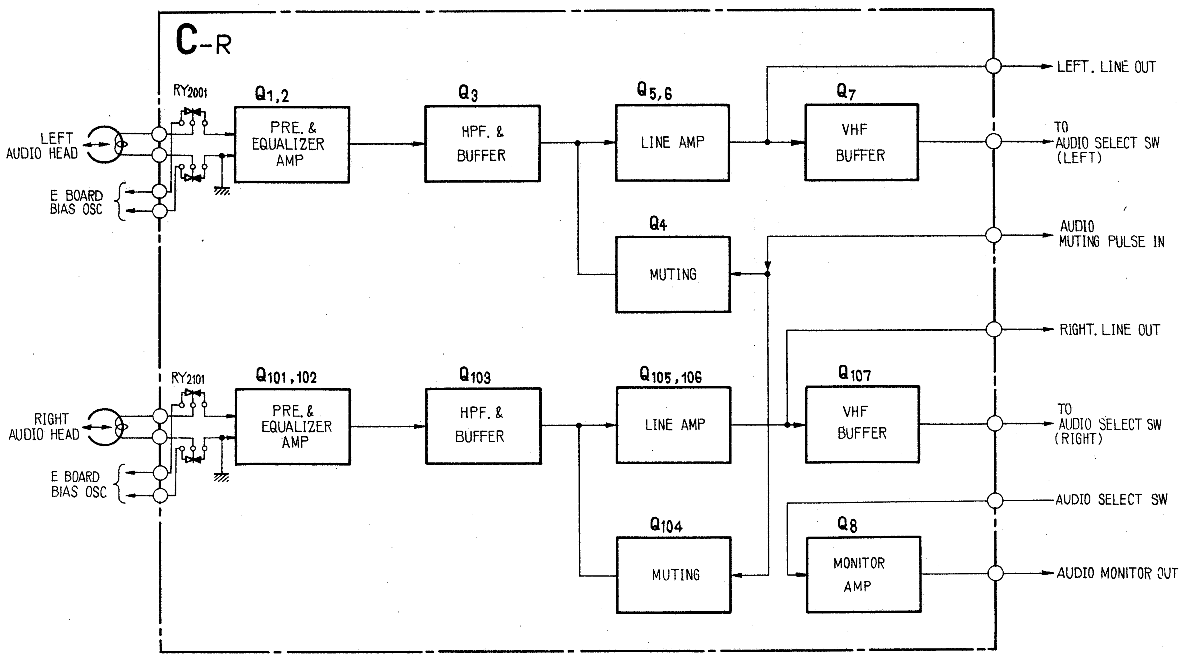

S6005
REW ← → OFF
S6002
STOP ← → OFF
S6003
PLAY ← → OFF
S6004
F.FWD ← → OFF
SONY 1-581-246-11
BLU
To D-1 Board ⑫ R55
GRN/WHT
To D-1 Board ⑪ Q3(c)
YEL/WHT
To D-1 Board ⑨ R14
GRN
To D-1 Board ⑩ R12
YEL
To D-1 Board ⑬ R16
ORG
To R Board S6017 (EE/PB SWITCH)
ORG
To E Board ⑮ C410
VLT
To C-R Board ① D1
VLT/WHT
To D-1 Board ⑭ D8

– W Board – Part No. X-36303-83-1


S6008 VHF CH. SELECT
To F Board ② +12V
GRY/RED
To F Board ③, shield cover
To F Board ⑤ L10
To F Board ④ L7
RED
YEL
To VHF OUT CASE (GND)
CH.4
CH.3

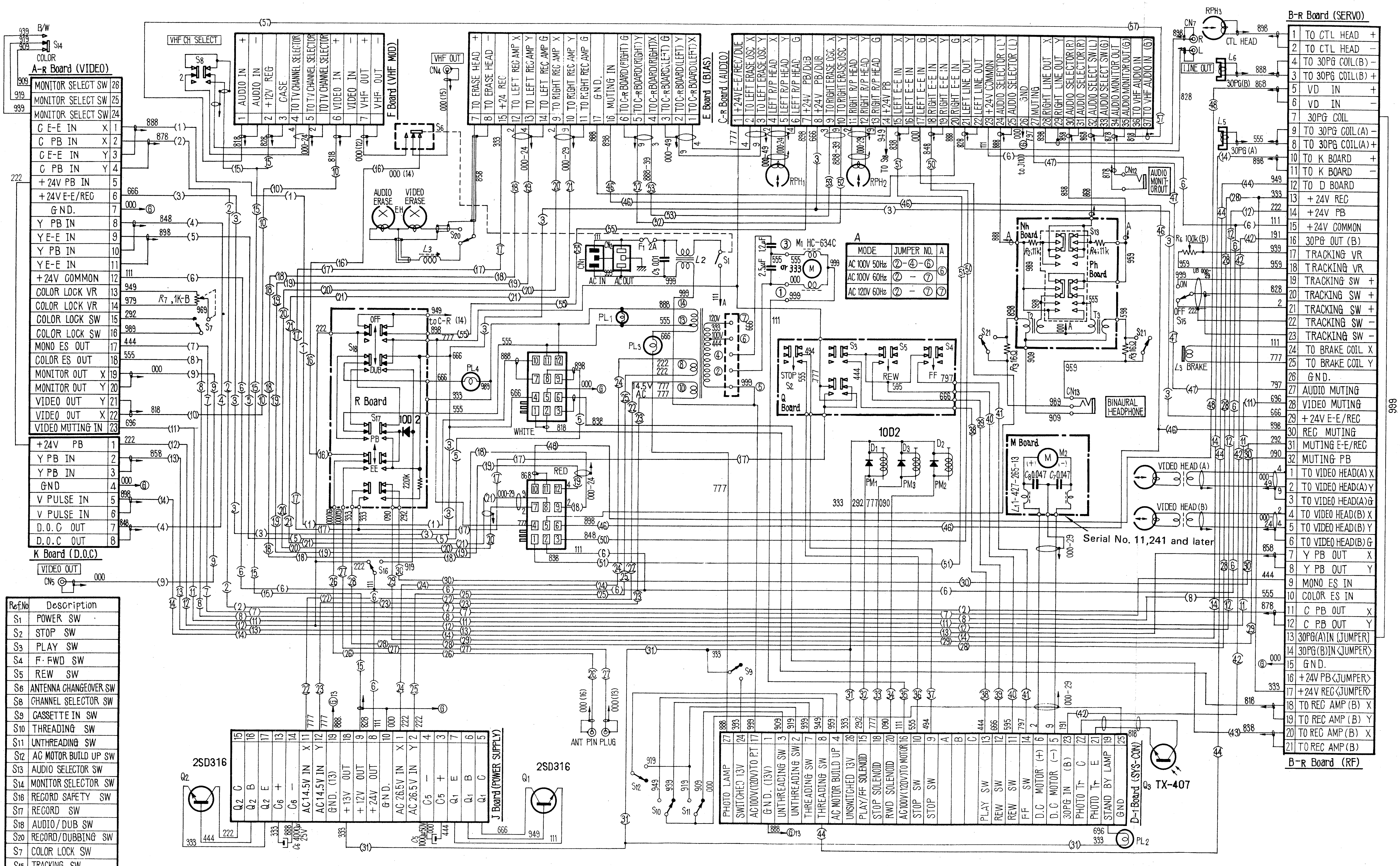
BLOCK DIAGRAM

– C-R Board – (Serial No. 11,001 and later)


C-R
RY2001
Q1,2
PRE. & EQUALIZER AMP
Q3
HPF. & BUFFER
Q5,6
LINE AMP
Q7
VHF BUFFER
Q4
MUTING
LEFT AUDIO HEAD
E BOARD BIAS OSC
LEFT. LINE OUT
TO AUDIO SELECT SW (LEFT)
AUDIO MUTING PULSE IN
RIGHT. LINE OUT
RY2101
Q101,102
PRE. & EQUALIZER AMP
Q103
HPF. & BUFFER
Q105,106
LINE AMP
Q107
VHF BUFFER
RIGHT AUDIO HEAD
E BOARD BIAS OSC
TO AUDIO SELECT SW (RIGHT)
Q104
MUTING
Q8
MONITOR AMP
AUDIO SELECT SW
AUDIO MONITOR OUT

Note: All reference numbers are in 2,000 series.

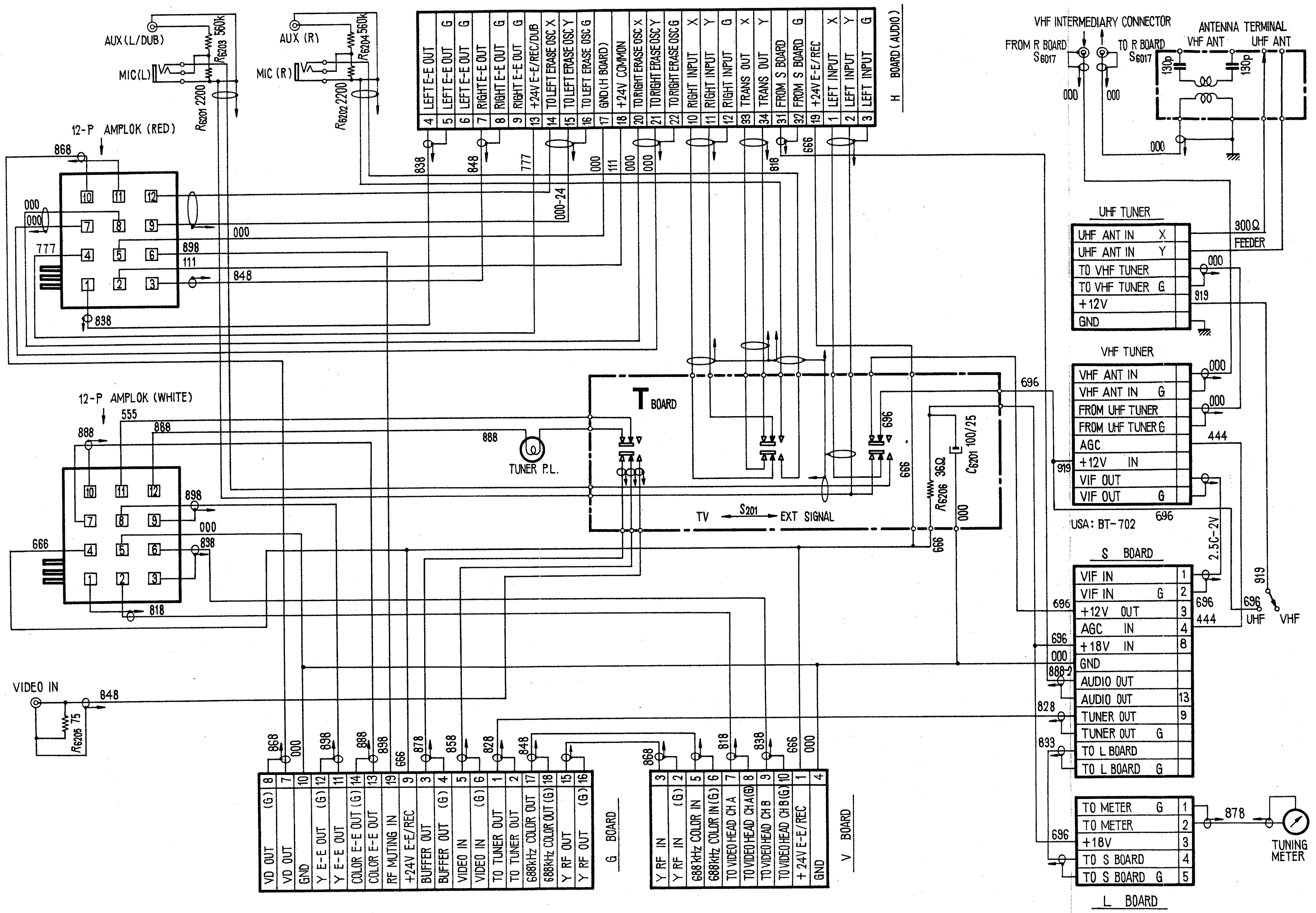
FRAME WIRING DIAGRAM – Main Chassis Section – (Serial No. 11,001 and later)


A-R Board (VIDEO)
MONITOR SELECT SW 26
MONITOR SELECT SW 25
MONITOR SELECT SW 24
C E-E IN X 1
C PB IN X 2
C E-E IN Y 3
C PB IN Y 4
+24V PB IN 5
+24V E-E/REC 6
GND. 7
Y PB IN 8
Y E-E IN 9
Y PB IN 10
Y E-E IN 11
+24V COMMON 12
COLOR LOCK VR 13
COLOR LOCK VR 14
COLOR LOCK SW 15
COLOR LOCK SW 16
MONO ES OUT 17
COLOR ES OUT 18
MONITOR OUT X 19
MONITOR OUT Y 20
VIDEO OUT Y 21
VIDEO OUT X 22
VIDEO MUTING IN 23
K Board (D.O.C)
+24V PB 1
Y PB IN 2
Y PB IN 3
GND 4
V PULSE IN 5
V PULSE IN 6
D.O.C OUT 7
D.O.C OUT 8
VIDEO OUT
CN5
VHF CH SELECT
S8
F Board (VHF MOD)
AUDIO IN
AUDIO IN
+12V REG
CASE
TO TV CHANNEL SELECTOR
TO TV CHANNEL SELECTOR
TO TV CHANNEL SELECTOR
VIDEO IN
VIDEO IN
VHF OUT
VHF OUT
VHF OUT
CN4
S6
AUDIO ERASE
VIDEO ERASE
EH
S20
L3
E Board (BIAS)
TO ERASE HEAD
TO ERASE HEAD
+24 REC
TO LEFT REC AMP X
TO LEFT REC AMP Y
TO LEFT REC AMP G
TO RIGHT REC AMP X
TO RIGHT REC AMP Y
TO RIGHT REC AMP G
GND.
MUTING IN
TO C-R BOARD (RIGHT) G
TO C-R BOARD (RIGHT) Y
TO C-R BOARD (RIGHT) X
TO C-R BOARD (LEFT) G
TO C-R BOARD (LEFT) Y
TO C-R BOARD (LEFT) X
C-R Board (AUDIO)
+24V E-E/REC/DUB
TO LEFT ERASE OSC
TO LEFT ERASE OSC
LEFT R/P HEAD
LEFT R/P HEAD
LEFT R/P HEAD
+24V PB/DUB
+24V PB/DUB
TO RIGHT ERASE OSC
TO RIGHT ERASE OSC
RIGHT R/P HEAD
RIGHT R/P HEAD
RIGHT R/P HEAD
+24V PB
LEFT E-E IN
LEFT E-E IN
LEFT E-E IN
RIGHT E-E IN
RIGHT E-E IN
RIGHT E-E IN
LEFT LINE OUT
LEFT LINE OUT
+24V COMMON
AUDIO SELECTOR (L)
AUDIO SELECTOR (L)
GND
MUTING
RIGHT LINE OUT
RIGHT LINE OUT
AUDIO SELECTOR (R)
AUDIO SELECT SW (L)
AUDIO SELECT SW (G)
AUDIO SELECT SW (R)
AUDIO MONITOR OUT
AUDIO MONITOR OUT (G)
TO VHF AUDIO IN
TO VHF AUDIO IN (G)
RPH1
RPH2
RPH3
CN7
CTL HEAD
LINE OUT
L6
30PG (B)
L5
30PG (A)
CN12
AUDIO MONIT-OR OUT
CN1
AC IN
AC OUT
F1 2A
C3 .001
L2
S1
M1 HC-634C
A
MODE | JUMPER NO. | A
AC 100V 50Hz | ②-④-⑥
AC 100V 60Hz | ② - ⑦
AC 120V 60Hz | ② - ⑦ ⑦
PL1
PL3
PL4
R Board
OFF
DUB
toC-R (14)
S18
S17
PB
EE
100 2
220K
WHITE
RED
4.5V AC
120V 100V
Q Board
S2 STOP
S3
S5 REW
S4 FF
10D2
D1
D3
D2
PM1
PM3
PM2
Nh Board
Ph Board
S13
R3 11k
R4 11k
T2
T3
R6 100k(B)
S15
S21
R3 16Ω
L3 BRAKE
CN13
BINAURAL HEADPHONE
M Board
M2
L1 1-427-265-13
C6 0.047
C7 0.047
VIDEO HEAD (A)
VIDEO HEAD (B)
Serial No. 11,241 and later
S16
S9
ANT PIN PLUG
2SD316
Q2
Q1
J Board (POWER SUPPLY)
Q2 C
Q2 B
Q2 E
C6 +
C6 −
AC 14.5V IN X
AC 14.5V IN Y
GND. (13)
+13V OUT
+12V OUT
+24V OUT
GND.
AC 26.5V IN X
AC 26.5V IN Y
C5 −
C5 +
Q1 E
Q1 B
Q1 C
C6 4000μ 25V
C5 1000μ 50V
S12
S10
S11
D-1 Board (SYS-CON)
PHOTO LAMP
SWITCHED 13V
AC100V(120V) TO P.T
GND. (13V)
UNTHREADING SW
UNTHREADING SW
THREADING SW
THREADING SW
AC MOTOR BUILD UP
UNSWITCHED 13V
PLAY/FF SOLENOID
STOP SOLENOID
RWD SOLENOID
AC100V(120V) TO MOTOR
STOP SW
STOP SW
PLAY SW
REW SW
REW SW
FF SW
D.C MOTOR (+)
D.C MOTOR (−)
30PG IN (B)
PHOTO Tr C
PHOTO Tr E
STAND BY LAMP
GND
PL2
Q3 TX-407
B-R Board (SERVO)
1 TO CTL HEAD +
2 TO CTL HEAD −
4 TO 30PG COIL(B) −
3 TO 30PG COIL(B) +
5 VD IN +
6 VD IN −
7 30PG COIL
9 TO 30PG COIL(A) −
8 TO 30PG COIL(A) +
10 TO K BOARD +
11 TO K BOARD −
12 TO D BOARD
13 +24V REC
14 +24V PB
15 +24V COMMON
16 30PG OUT (B)
17 TRACKING VR
18 TRACKING VR
19 TRACKING SW +
20 TRACKING SW +
21 TRACKING SW +
22 TRACKING SW −
23 TRACKING SW −
24 TO BRAKE COIL X
25 TO BRAKE COIL Y
26 GND.
27 AUDIO MUTING
28 VIDEO MUTING
29 +24V E-E/REC
30 REC MUTING
31 MUTING E-E/REC
32 MUTING PB
B-R Board (RF)
1 TO VIDEO HEAD(A) X
2 TO VIDEO HEAD(A) Y
3 TO VIDEO HEAD(A) G
4 TO VIDEO HEAD(B) X
5 TO VIDEO HEAD(B) Y
6 TO VIDEO HEAD(B) G
7 Y PB OUT X
8 Y PB OUT Y
9 MONO ES IN
10 COLOR ES IN
11 C PB OUT X
12 C PB OUT Y
13 30PG(A) IN (JUMPER)
14 30PG(B) IN (JUMPER)
15 GND.
16 +24V PB (JUMPER)
17 +24V REC (JUMPER)
18 TO REC AMP (B) X
19 TO REC AMP (B) Y
20 TO REC AMP (B) X
21 TO REC AMP (B)

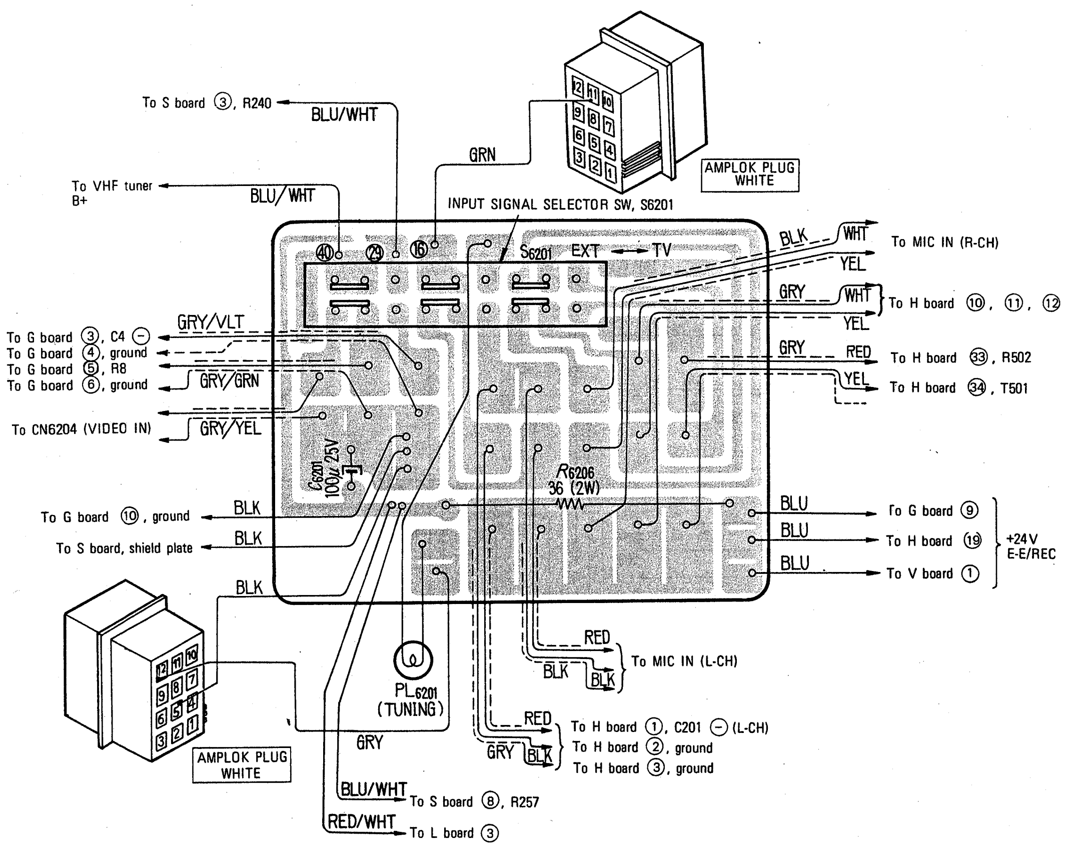
Ref.No	Description
S1	POWER SW
S2	STOP SW
S3	PLAY SW
S4	F·FWD SW
S5	REW SW
S6	ANTENNA CHANGEOVER SW
S8	CHANNEL SELECTOR SW
S9	CASSETTE IN SW
S10	THREADING SW
S11	UNTHREADING SW
S12	AC MOTOR BUILD UP SW
S13	AUDIO SELECTOR SW
S14	MONITOR SELECTOR SW
S16	RECORD SAFETY SW
S17	RECORD SW
S18	AUDIO/DUB SW
S20	RECORD/DUBBING SW
S7	COLOR LOCK SW
S15	TRACKING SW
S21	HEADPHONE LEVEL SW

Note: All reference numbers of electrical parts in this diagram are in 6,000 series.

FRAME WIRING DIAGRAM – Record Pack Section –


AUX (L/DUB)
MIC (L)
R6203 560k
R6201 2200
AUX (R)
MIC (R)
R6204 560k
R6202 2200
12-P AMPLOK (RED)
12-P AMPLOK (WHITE)
H BOARD (AUDIO)
4 LEFT E-E OUT X
5 LEFT E-E OUT G
6 LEFT E-E OUT G
7 RIGHT E-E OUT G
8 RIGHT E-E OUT G
9 RIGHT E-E OUT G
13 +24V E-E/REC/DUB
14 TO LEFT ERASE OSC X
15 TO LEFT ERASE OSC Y
16 TO LEFT ERASE OSC G
17 GND (H BOARD)
18 +24V COMMON
20 TO RIGHT ERASE OSC X
21 TO RIGHT ERASE OSC Y
22 TO RIGHT ERASE OSC G
10 RIGHT INPUT X
11 RIGHT INPUT Y
12 RIGHT INPUT G
33 TRANS OUT X
34 TRANS OUT Y
31 FROM S BOARD
32 FROM S BOARD G
19 +24V E-E/REC
1 LEFT INPUT X
2 LEFT INPUT Y
3 LEFT INPUT G
T BOARD
TUNER P.L.
TV S201 EXT SIGNAL
R6206 36Ω
C6201 100/25
VHF INTERMEDIARY CONNECTOR
FROM R BOARD S6017
TO R BOARD S6017
ANTENNA TERMINAL
VHF ANT
UHF ANT
130p
300Ω FEEDER
UHF TUNER
UHF ANT IN X
UHF ANT IN Y
TO VHF TUNER
TO VHF TUNER G
+12V
GND
VHF TUNER
VHF ANT IN
VHF ANT IN G
FROM UHF TUNER
FROM UHF TUNER G
AGC
+12V IN
VIF OUT
VIF OUT G
USA: BT-702
S BOARD
VIF IN 1
VIF IN G 2
+12V OUT 3
AGC IN 4
+18V IN 8
GND
AUDIO OUT
AUDIO OUT 13
TUNER OUT 9
TUNER OUT G
TO L BOARD
TO L BOARD G
2.5C-2V
UHF
VHF
TO METER G 1
TO METER 2
+18V 3
TO S BOARD 4
TO S BOARD G 5
L BOARD
TUNING METER
VIDEO IN
R6205 75
G BOARD
8 VD OUT (G)
7 VD OUT
10 GND
12 Y E-E OUT (G)
11 Y E-E OUT
14 COLOR E-E OUT (G)
13 COLOR E-E OUT
9 RF MUTING IN
9 +24V E-E/REC
3 BUFFER OUT
4 BUFFER OUT (G)
5 VIDEO IN
6 VIDEO IN (G)
1 TO TUNER OUT
2 TO TUNER OUT
17 688kHz COLOR OUT
18 688kHz COLOR OUT (G)
15 Y RF OUT
16 Y RF OUT (G)
V BOARD
3 Y RF IN
2 Y RF IN (G)
5 688kHz COLOR IN
6 688kHz COLOR IN (G)
7 TO VIDEO HEAD CH A
8 TO VIDEO HEAD CH A (G)
9 TO VIDEO HEAD CH B
10 TO VIDEO HEAD CH B (G)
1 +24V E-E/REC
4 GND
868
000
777
898
111
848
838
555
888
666
818
878
858
828
696
919
444
833
888-2
000-24

MOUNTING DIAGRAM – T Board –


To S board ③, R240
BLU/WHT
GRN
AMPLOK PLUG WHITE
To VHF tuner B+
BLU/WHT
INPUT SIGNAL SELECTOR SW, S6201
㊵ ㉙ ⑯
S6201 EXT TV
BLK
WHT
To MIC IN (R-CH)
YEL
GRY
WHT
YEL
To H board ⑩, ⑪, ⑫
GRY
RED
YEL
To H board ㉝, R502
To H board ㉞, T501
GRY/VLT
To G board ③, C4 ⊖
To G board ④, ground
To G board ⑤, R8
To G board ⑥, ground
GRY/GRN
To CN6204 (VIDEO IN)
GRY/YEL
C6201 100μ 25V
R6206 36 (2W)
To G board ⑩, ground
BLK
To S board, shield plate
BLK
BLK
BLU
To G board ⑨
BLU
To H board ⑲
BLU
To V board ①
+24V E-E/REC
RED
BLK
BLK
To MIC IN (L-CH)
PL6201 (TUNING)
RED
GRY
BLK
To H board ①, C201 ⊖ (L-CH)
To H board ②, ground
To H board ③, ground
GRY
AMPLOK PLUG WHITE
BLU/WHT
To S board ⑧, R257
RED/WHT
To L board ③

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SONY®
SERVICE MANUAL

VIDEOCASSETTE VO-1600

No. 3
October, 1972

SUPPLEMENT

SUBJECT: BIAS OSCILLATOR CIRCUIT AND E BOARD CHANGE

This supplement updates the VO-1600 Service Manual.
The bias oscillator circuit is changed from class-C amplifier to push-pull amplifier. The printed-circuit board pattern and mounting are altered to accomodate the changes. The new circuit provides sufficient erase current through the normal operating temperature range. Refer to VO-1600 SERVICE MANUAL section 11–25, page 11–25. Applied to units bearing Serial NO. 19101 and higher.

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9-966-146-83

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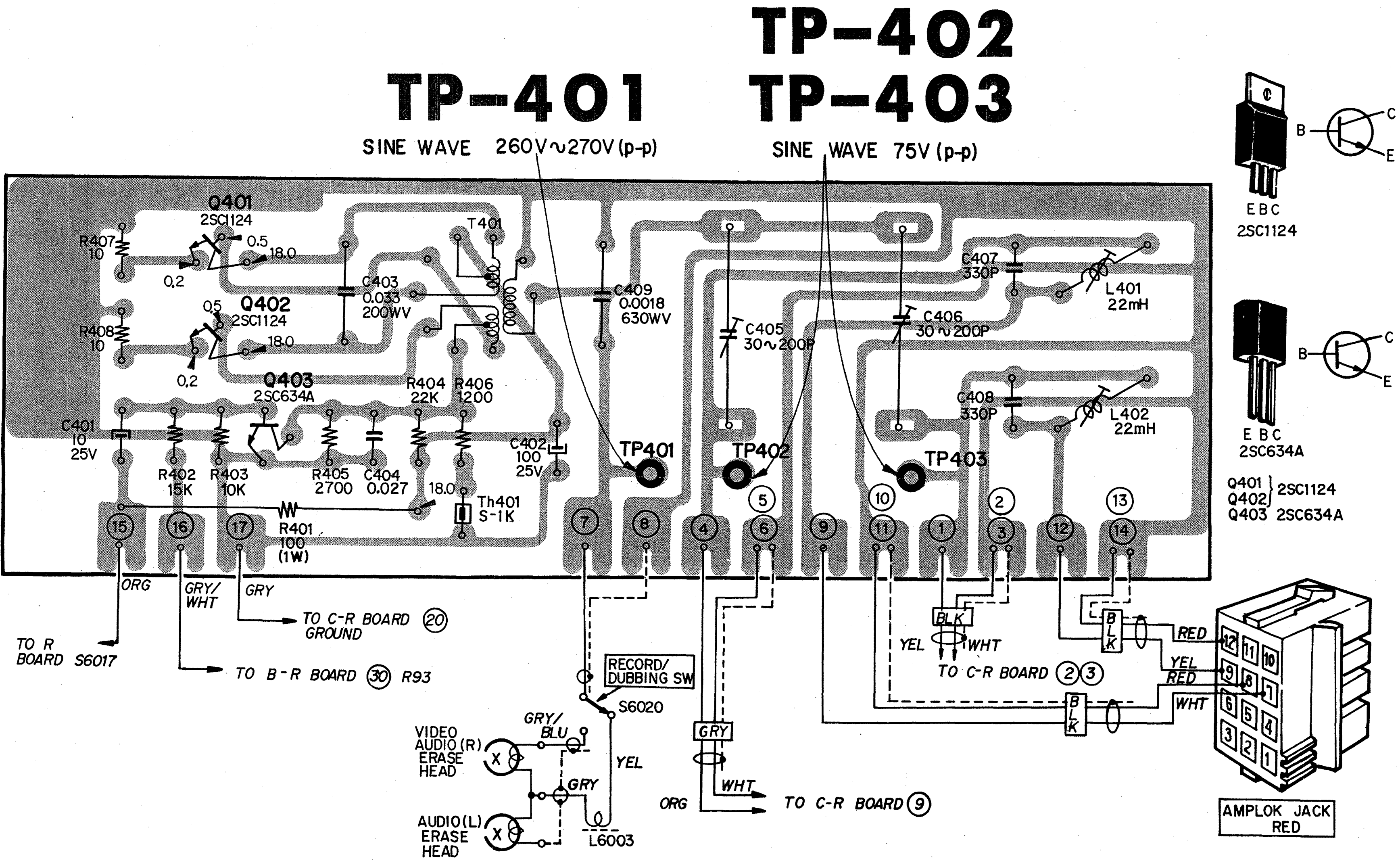
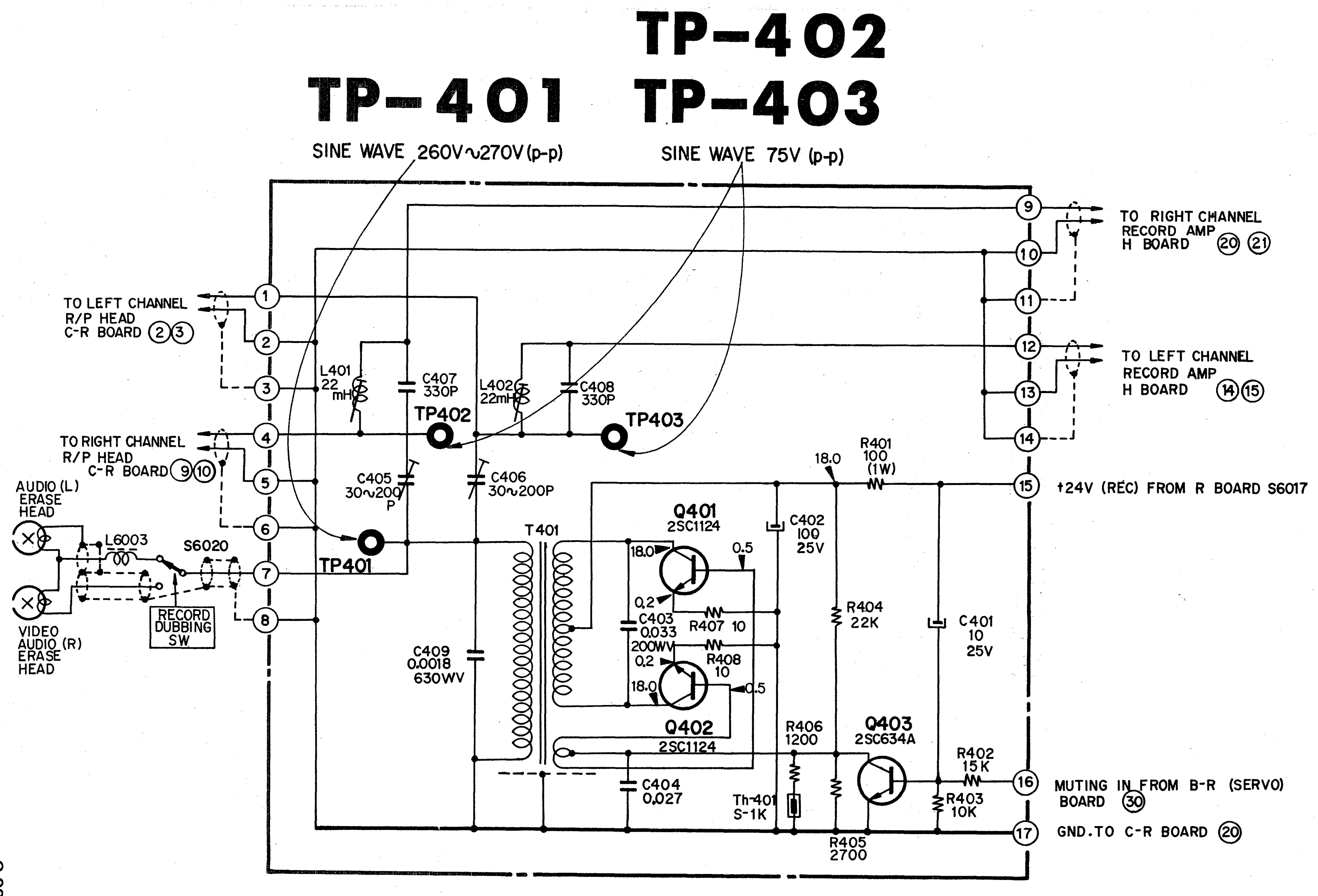
E PRINTED CIRCUIT BOARD


TP-402
TP-401
TP-403
SINE WAVE 260V∿270V (p-p)
SINE WAVE 75V (p-p)
Q401 2SC1124
Q402 2SC1124
Q403 2SC634A
R407 10
R408 10
0.5
18.0
0.2
T401
C403 0.033 200WV
C409 0.0018 630WV
C405 30∿200P
C406 30∿200P
C407 330P
C408 330P
L401 22mH
L402 22mH
R404 22K
R406 1200
C401 10 25V
R402 15K
R403 10K
R405 2700
C404 0.027
C402 100 25V
Th401 S-1K
R401 100 (1W)
TP401
TP402
TP403
ORG
GRY/WHT
GRY
TO C-R BOARD ⑳ GROUND
TO R BOARD S6017
TO B-R BOARD ㉚ R93
RECORD/DUBBING SW
S6020
GRY/BLU
YEL
GRY
VIDEO AUDIO (R) ERASE HEAD
AUDIO (L) ERASE HEAD
L6003
GRY
WHT
ORG
TO C-R BOARD ⑨
BLK
YEL
WHT
TO C-R BOARD ②③
RED
AMPLOK JACK RED
E B C
2SC1124
2SC634A
B
C
E
Q401 } 2SC1124
Q402 }
Q403 2SC634A

X-03270-72-0

SCHEMATIC DIAGRAM


TP-402
TP-401
TP-403
SINE WAVE 260V∿270V (p-p)
SINE WAVE 75V (p-p)
TO RIGHT CHANNEL RECORD AMP H BOARD ⑳㉑
TO LEFT CHANNEL RECORD AMP H BOARD ⑭⑮
TO LEFT CHANNEL R/P HEAD C-R BOARD ②③
TO RIGHT CHANNEL R/P HEAD C-R BOARD ⑨⑩
AUDIO (L) ERASE HEAD
VIDEO AUDIO (R) ERASE HEAD
L6003
S6020
RECORD DUBBING SW
L401 22 mH
C407 330P
L402 22mH
C408 330P
TP402
TP403
TP401
C405 30∿200P
C406 30∿200P
T401
C409 0.0018 630WV
Q401 2SC1124
Q402 2SC1124
Q403 2SC634A
18.0
0.5
0.2
C403 0.033 200WV
R407 10
R408 10
C402 100 25V
R401 100 (1W)
R404 22K
C401 10 25V
R406 1200
R402 15K
R403 10K
C404 0.027
Th-401 S-1K
R405 2700
+24V (REC) FROM R BOARD S6017
MUTING IN FROM B-R (SERVO) BOARD ㉚
GND. TO C-R BOARD ⑳

C-03270-52-0

NOTE:

1. ALL RESISTORS IN OHMS ¼W UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. SCHEMATIC REFERENCE NUMBERS ARE 2000 SERIES.
4. (   ) REPRESENTS THE DC VOLTAGE MEASURED WITH A VOM (20KΩ/V).